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AN EVALUATION OF FUNCTIONAL MATHEMATICS SKILLS IN AN ADULT BASIC EDUCATION PROGRAM

University — Université
UNIVERSITY OF ALBERTA

Degree for which thesis was presented — Grade pour lequel cette thèse fut présentée
M ED.

Year this degree conferred — Année d'obtention de ce grade 1983	Name of Supervisor — Nom du directeur de thèse DR. D J. COLLETT

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AN EVALUATION OF FUNCTIONAL MATHEMATICS SKILLS IN AN ADULT BASIC EDUCATION PROGRAM

by

Ⓒ CHARLES EDWARD TED BROOKS

A THESIS
SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE
OF MASTER OF EDUCATION
IN
VOCATIONAL EDUCATION

DEPARTMENT OF INDUSTRIAL
AND VOCATIONAL EDUCATION

EDMONTON, ALBERTA
FALL, 1983

THE UNIVERSITY OF ALBERTA

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled "An Evaluation of Functional Mathematics Skills in an Adult Basic Education Program", submitted by Charles Edward Ted Brooks in partial fulfilment of the requirements for the degree of Master of Education in Vocational Education.

(Supervisor)

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Date October 7, 1983

ABSTRACT

The Adult Basic Skills (ABS) listing is a catalogue of approximately 1000 skills which has been compiled to define the functional tasks in daily living that competent adults in Alberta normally perform in their various social roles. The purpose of the study reported in this thesis was to determine the possible implications of incorporating all the mathematically related Adult Basic Skills into the mathematics program in the department of Adult Basic Education (ABE) at the Alberta Vocational Centre in Edmonton, Alberta. A further purpose of the study was to provide feedback to the continuing development of the ABS listing.

The major sources of data for the study were semi-structured interviews held with each of the seven full time mathematics instructors in the ABE mathematics program. During the interview meetings, the instructors also performed a multi-stepped card sort procedure designed to determine the extent to which each of the mathematical Adult Basic Skills was already being taught in the ABE program. The card sort procedure and the interviews were designed on the basis of an examination of ABE course texts and course descriptions, as well as discussions with the directors of both the ABE mathematics program and the Adult Basic Skills project.

The results of the study showed that the mathematical Adult Basic Skills were, in general, already included in the ABE program, but that only the traditional, "three-R's" types of skills were consistently emphasized in instruction. Functional mathematics skills, for example "Manage Family Finances", tended to be included in the curriculum, but taught to a much lesser degree. Although instructors evidenced enthusiasm for incorporating functional mathematics skills in their courses, and showed a history of some attempts to do so, pragmatic restrictions in the purpose and goals of the ABE department tend to inhibit such attempts. In its present structure, the department must serve academic upgrading requirements; also, student needs, desires and abilities vary.

Instructors proposed three possible options for incorporating the mathematical Adult Basic Skills. The intent of each of the options was to provide enough flexibility for needed individualized instruction, and to avoid requiring changes in the fundamental goals of the ABE department.

The study resulted in a general validation of the mathematical Adult Basic Skills, however instructors indicated some skills which, although perhaps necessary for adult Albertans, were considered as not relevant or too complex for some ABE students to attain. Instructors recommended activities to define which Adult Basic Skills should and should not be taught in the ABE program.

Given various options for incorporating the mathematical Adult Basic Skills, the fact that many were already taught to some degree, and the fact that some others might not be appropriate for instruction, it was concluded that incorporation of the mathematical Adult Basic Skills might be feasible without changing the present structure of the ABE program.

ACKNOWLEDGEMENTS

The author would like to express his appreciation to several individuals for their contributions to this study. The flexibility and perseverance of Dr. Dave Collett, thesis supervisor, made the study possible, as he gently helped explore the problems that arose. Thank you also to Dr. Karel Puffer for agreeing to participate in the examining committee and for his precise and discriminating feedback throughout the performance of the study. The author is grateful to Dr. Mike Andrews for his encouragement and support of the study by making the Alberta Vocational Centre in Edmonton so freely available for the study to take place, and for donating his time as a member of the examining committee. The author would like to take the opportunity to express his heartfelt appreciation and gratitude to Professor Art Deane, not just for his assistance as member of the thesis committee, but for his unending guidance, support and mentoring during the course of the author's studies in the Department of Industrial and Vocational Education.

Finally, thank you also to Gerry Kendal for his ever present helping hand and for providing necessary word processing facilities in the nick of time.

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CHAPTER ONE

Introduction

Curriculum development for Competency Based Education (CBE) can often be a relatively lengthy and expensive process. One system which can be used in a systematic way to construct a CBE curriculum is the Competency Analysis Profile (CAP) system of Deane and Manuel (1977). The CAP system is a five stage process. The first two stages involve identification of competency areas and the validation of those areas. This results in a profile of competencies which is usually arranged in a chart form. The last three stages may involve months of intensive work by curriculum specialists.

In July 1981, the Alberta Department of Advanced Education and Manpower let a contract for the development of a CAP to identify the "functional tasks in daily living that competent adults normally perform in their various roles as members of Alberta's society." The CAP chart was to be the first step toward defining the basic skills required in any program of Adult Basic Education (ABE) within the system of Alberta Vocational Centres (AVC's) operated by the Department of Advanced Education and Manpower.

As a result of the contract, a CAP containing 104 skills was produced and validated by a survey of 550 Alberta adults. The validation process resulted in changes in the profile and a second draft was produced.

It was felt that the skills in the CAP were not yet specific enough to allow the creation of instructional objectives for curriculum design. Thus, in a third phase of the project, a series of short profiling sessions was held wherein each of the basic skills in the second draft profile was used as the basis for a new profile of skills. This process, and the resulting analysis that followed, resulted in a bank of approximately 1000 basic skills needed by adult Albertans to function in society. This skills listing has been termed the Adult Basic Skills (ABS) listing, and has been distributed to the AVC's in the form of a catalogue of skills (Collett, Deane, Kendal & Brooks, 1983).

The long term objectives of the activities of the Alberta Vocational Centres are to produce curriculum changes based on the basic skills which have been identified and, ultimately, to create an Adult Basic Education certification for the Province of Alberta (Alberta, 1980).

Purpose of the Study

The purpose of this study was to provide an evaluation of some aspects of the relationship between the ABS listing and the existing ABE program at AVC Edmonton. Specifically, the study was designed to provide an indication of the degree of change which might be required in the existing ABE Mathematics curriculum if the mathematically oriented skills from the ABS listing were to be incorporated into the curriculum.

An auxiliary purpose of this study was to offer an opportunity for ABE instructors to provide feedback, in a systematic way, to the continuing process of the development of the ABS listing. Further, since the study was designed to provide an indication of how a portion of the ABS listing compared to the corresponding course offerings in the ABE program at the AVC in Edmonton, it was hoped that the study might thus lay some basis for future comparisons concerning other portions of the ABS listing and other ABE offerings in Edmonton and elsewhere.

Statement of the Problem

In order to meet its intended purpose, the study sought answers to the following questions:

1. "To what extent are each of the various mathematically oriented skills in the ABS listing being taught in the Adult Basic Education department at the AVC in Edmonton?"
2. "What would be the implications if the mathematically oriented Adult Basic Skills were to be incorporated into the Mathematics program?"
3. "What would be some possible methods to accomplish the incorporation of the skills?"
4. "What are the concerns and suggestions of the ABE mathematics instructors with respect to the ABS listing and the curriculum development process?"

The Adult Basic Skills listing contains mathematics skills in two ways. First, it contains some skills which are directly mathematical, for example, "Write numbers". Second, the listing contains skills in which mathematics is only one aspect of the skill, for example, "Understand Cash Transactions". Both types of mathematics skills were included in the study, and are referred to here as the "ABS mathematically oriented skills", or, in short, as the "ABS mathematics skills". The study did not presume to which of these two categories each skill belonged, but rather included in the data collection instruments a procedure for determining the category for each skill.

Need for the Study

Systems used for developing a curriculum invariably involve, at an early stage, development of program goals and objectives (Tyler, 1949; McNeil, 1977). If the objectives are being designed to replace an existing curriculum, there should, at some point, be a systematic comparison between the existing curriculum and the contemplated changes. Such a comparison provides useful feedback for the development process, and it is apparent that the earlier in the process that comparative information exists, the better.

Curriculum evaluation should be an integral part of the curriculum development process. Lewy (1977), after discussing the evaluation needs in the planning stage of curriculum development stated:

> Thorough examination of various aspects of the program at this early stage can highly increase its efficiency and can reduce costly trial and error in the later stages of its existence. (p. 17)

Yet, as stated by English (1978):

> Data is rarely gathered to carefully examine an existing configuration instead of assuming that...the curriculum should be changed by developing new guidelines. (p. 26)

Since the information contained in the ABS listing may be the foundation for the expenditure of considerable long term financial and manpower resources, and since the ABS listing may ultimately cause significant changes in ABE programs in the AVC's, some investigation of the content of the ABS listing as compared to the existing ABE curriculum would seem to be appropriate. Any indication as to how much change is likely to occur in AVC programs should help when choices are made about methods to be used for curriculum development, and it should help when estimates are made concerning resources needed to effect the change.

This study used the ABS skills listing information to compare the existing curriculum to the contemplated curriculum changes. In this way, it was hoped to provide feedback to the curriculum development process at an early stage in that process.

Previous discussions with those responsible for the development of the ABS listing had shown that they were concerned about the adequacy of the mathematics skills in the listing. The information gained in this evaluation was thus also aimed at serving this previously expressed issue.

Assumptions

In the design of this study, the following basic assumptions were made:

In looking for implications resulting from the potential incorporation of the ABS Mathematics skills into the ABE Mathematics curriculum, it was assumed that incorporation would occur without causing any fundamental changes in the program structure of the ABE department at AVC. More specifically, it was assumed that the Mathematics program itself would not be eliminated by any general incorporation of the Adult Basic Skills.

It was assumed that no biases were introduced by the interviewer during the interview process which would affect the interview process in such a manner as to affect the reliability of the interview results.

In the design of the study instruments it was also assumed that the AVC instructors would all interpret the meaning of the ABS skill statements in fundamentally the same way.

Delimitations and Limitations

Delimitations

This study was delimited to the Adult Basic Education mathematics program at the AVC in Edmonton. Although there are also ABE mathematics programs existing at the other three AVC's (Calgary, Grouard, Lac La Biche) and at the CVC's (Community Vocational Centres) in the Slave Lake region, and although all of these institutions are a part of the same system, each facility designs its own program, and there are thus variations in programs throughout the system.

The portion of the Adult Basic Skills listing used in this study was delimited to include only the mathematics skills.

The study sought to establish which ABS mathematics skills were included in the ABE program, but was not designed to find which ABE program skills were included or not included in the ABS listing. It thus did not seek to find the overall degree of overlap between the two sets of skills.

Limitations

This study is limited by its reliance on the opinions and perceptions of the participants. It is also limited by the small number of such participants involved in the study.

Method of the Study

The following is a brief description of the manner in which the study was carried out.

In order to determine the most appropriate information to research, and the most appropriate methods to obtain the information, meetings were held with both AVC supervisory staff, and the directors of the Adult Basic Skills project. The AVC meetings produced a description of the ABE mathematics program, and a list of skills currently taught in its curriculum.

The ABS listings were inspected by the researcher and all mathematically oriented skills, a total of 68, were selected from the listings. A card sorting procedure, based on the Q-methodology of Stephenson (1953), was developed to determine the extent to which the ABS mathematics skills were being taught by AVC instructors in the ABE program.

The card sorting procedure was used as an integral part of a semi-structured interview held with each mathematics instructor. The interviews sought the instructors' opinions on the accuracy of the ABS mathematics skills, how those skills compared to the existing ABE program, and the possible implications of incorporating the ABS skills into the ABE program.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

This chapter includes two sections. First, in order to provide a conceptual framework for the structure of the study, a review of literature pertaining to educational evaluation was performed. Second, in order to provide background information on the topic of Adult Basic Education, a review of the literature was made in this area with emphasis on studies or writings pertaining to "functional skills", life skills", "Competency Based Adult Education", and similar concepts. This section also includes a discussion of the ways in which mathematics competencies are presented in adult functional competency programs.

Educational Evaluation

The field of educational evaluation has expanded rapidly during the past fifteen to twenty years. It is often stated that this expansion was a result of the need, in the United States, for evaluation of the large numbers of educational programs begun in the early 1960's (MacKay and Maguire, 1971; Cronbach et al, 1980). The community of educational researchers has had to work quickly to try to keep up with the demand for useful, accurate and reliable evaluations.

As a result evaluators have borrowed as models for evaluation design the procedures, methods and perspectives from other sciences in addition to creating new directions of their own. The continuing attempts at creating fresh evaluation methodologies for educational evaluation have naturally resulted in a proliferation of techniques. Guba and Lincoln (1981) after a review of the literature said they found over 40 evaluation models sufficiently formalized to appear in the literature since 1967 alone.

Each evaluation model is accompanied by its own perspective, definition of evaluation and underlying assumptions. In order to understand the field, various authors have attempted to classify the models in different ways. For example Stake (1976) classified evaluation methods into 9 categories depending on the approach used in each method; whether the approach was predominantly oriented towards the use of the judgements of experts, towards institutional self-study by staff, etc. Morris and Fitzgibbon (1978) have grouped evaluation methods according to the emphasis inherent in the model; emphasis might be placed on goals, on decisions, or on research, amongst others. Guba and Lincoln (1981) preferred to classify evaluation methods according to the "organizer" used. The method might be organized by objectives, by decisions or by the effects of the program being studied, etc.

Although, as noted by Smith (1982b), there is more to insuring the usefulness of an evaluation than choosing a method or model, this choice is an important consideration. The literature concerning the training of evaluators gives emphasis to having knowledge of methodologies as an important prerequisite for the novice evaluator.

Thus this review had to concern itself with evaluation methods and models. Due to the large number and variety of methods existing, a selection has been made of models and perspectives that could affect the present study, as well as some of the emerging techniques, the latter in order to give an overview of the present directions of the field. In so doing, the important general considerations in the field are discussed. This review then builds on these considerations by discussing the most recent efforts of leading evaluators who have attempted to standardize the field of educational evaluation by looking for the commonly sought after qualities and standards of all evaluation methods.

The CIPP Model

The well known CIPP (Context, Input, Process, Product) model of evaluation first appeared in 1971 in the book "Educational Evaluation and Decision Making" authored by Daniel Stufflebeam and others. This book represented the results of work sponsored by the Phi Delta Kappa National

Study Committee on Evaluation over the period from 1968 to 1970. The committee actually refined the CIPP model which had already been worked on by Stufflebeam. Egon Guba, who was also on the committee, was a major contributor.

The perspective that underlies the CIPP model is shown in its definition of Evaluation:

> Evaluation is the process of delineating, obtaining, and providing useful information for judging decision alternatives. (Stufflebeam et al, 1971, (p. XXV)

This definition indicates that the purpose of evaluation is not to make judgments on the merit of a program, but rather to serve the decision maker, whoever he might be. Thus the CIPP model is often described as "Decision-oriented" evaluation. However Scriven (1967,1969) feels that the act of evaluation necessarily implies a judgement, and that the evaluator who does not express a judgement is not doing his job. Also Stake (1967) feels that the evaluator should at least process judgement data for his audience. However the type of definition quoted above is echoed by many authors, among them Alkin and Fitzgibbon (1975), Hamilton et al (1977), MacDonald (1973) and Ross (1980) who feel, to varying degrees, that the role of the evaluator is to make measurements and provide information for decision makers.

The CIPP model divides decisions into four classes: planning, structuring, implementing and recycling. In planning decisions there are choices of objectives. Structuring decisions are made when designing projects to achieve given objectives. Implementing decisions are made when the project is actually being brought into service. Recycling decisions refer to the judgement of, and reaction to project results.

Since there are four kinds of decisions, the model includes four kinds of evaluation (Stufflebeam, 1974):

1. Context evaluation serves planning decisions by identifying unmet needs, unused opportunities, and underlying problems.

2. Input evaluation serves structuring decisions by projecting and analyzing alternative procedural designs.

3. Process evaluation serves implementing decisions by monitoring project operations.

4. Product evaluation serves recycling decisions by identifying and assessing project results.

The CIPP model has been categorized by Stake (1976) as a Management Analysis approach since the evaluation study is done mainly to assist program managers to make immediate or repetitive decisions. CIPP gives primary attention to the transactions involved in the construction of a project. CIPP is certainly not the only evaluation model which is management oriented. Rippey (1973), for instance, created a model which he called "Transactional Evaluation", based on the organizational theories of the late 1960's. Transactional evaluation was "concerned with the system undergoing change rather than the outcomes of the system's activity" (pg. xiii). It may be seen from Stufflebeam's listing (above) of the CIPP evaluation types that CIPP shares, with Rippey's model, a predominant concern with the method of evaluation rather than with the product or result of the evaluation. This orientation was objected to by some authors. Scriven (1972a) describes the Context stage as market research which is "not evaluation at all." However, if we consider the Context stage as similar to a needs assessment, as do Guba and Lincoln (1981), then we can see that it does have support from authors who support that concept in educational evaluation.

The CIPP model is flexible since the four stages can be used independently. Context evaluation can be a continuing process underlying the implementation of each of the other stages. The model is also designed to provide a basis for accountability. Each stage provides a record of activities: objectives chosen and rejected and why; procedural designs chosen and rejected and why etc. Thus, according to Stufflebeam (1974) the CIPP model can be used proactively to serve decision making, or retroactively to serve accountability.

It may be noted that the CIPP model treats program objectives in detail during the Context stage. There has been some discussion in the literature, especially at about the time the CIPP model was published, concerning how to deal with program goals and objectives. With its roots in a scientific research background, educational evaluation had made emphasis on the use of program goals/objectives as reference markers to measure whether a program or curriculum had achieved its aims. Ralph Tyler's (1949) work not only used objectives in this way, it detailed methods for arriving at program objectives if none existed.

Cronbach (1963) started to move away from objectives and towards the decision maker. However Scriven (1972a) went to the extreme of suggesting that evaluation should be done while consciously avoiding knowledge or contact with a program's existing goals. His Goal Free Evaluation model says that the evaluation, during its course, should determine the results of the program, since unintended "side effects" are often as important as the intended goals of a program. Those who have attempted to perform Goal Free Evaluation, such as Welch (1978) point out many practical problems with the approach, especially political friction with those commissioning the evaluation. Scriven (1979) has lately placed historical value in Goal Free Evaluation for the challenge it has posed to standard approaches of evaluation and the caution it has raised in evaluators looking for objectivity. Also, Egon Guba, himself one of the principals of the CIPP committee, has praised Scriven's efforts for that reason (Guba and Lincoln, 1981).

CIPP provides a comprehensive detailed method for approaching evaluation (Webster, 1981). Its general purpose is to increase rationality in day to day decisions (Stake, 1976). However CIPP is difficult to operationalize (Guba and Lincoln, 1981) and it makes some assumptions about decision making that may not be tenable. Guba (1979) points out that decision authority itself may not be localized and may be hard to pin down. Further he notes the assumption that decisions are actually made in some explicit way whereas "decisions more often simply 'bubble up" and when they are officially recognized - e.g. in some ratification vote - they have already been made in all important operational senses" (p. 140).

Nevertheless, CIPP has had an important impact. It is being used, especially in large scale administrations (Webster, 1981). Ross (1980) has taken its concepts a step further by giving even more importance to the decision. He discusses what he calls "decision rules":

> program evaluators serve decision makers by collecting information about the value of alternatives that are being considered for a given decision problem...Decision rules define the conditions under which each of these alternatives would be selected." (p. 60)

Responsive Evaluation

As formulated by Stake (1975), Responsive Evaluation places more emphasis on the "issues" of the evaluation as defined by the audience of the evaluation.

> ...there are different ways to evaluate programs and no one way is the right way. I prefer to think of ways that evaluation can perform a service and be useful to specific persons. For an evaluation to be useful, the evaluator should know the interests and the language of his audiences. During an evaluation study, a substantial amount of time may well be spent in learning about the information needs of the persons for whom the evaluation is being done. The evaluator should have a good sense of whom he is working for and their concerns. (p. 13)

Thus a Responsive Evaluation responds to audience requirements for information. In order to do this, the evaluator first observes the program in detail, and only then determines what to look for. This is done by intense interaction with his "audience" (in the widest sense of the word). The evaluator must decide which of the issues and questions raised by those he has contacted can be included in his information seeking activities.

Part of the basis for Stake's model is that all evaluation activities contain or imply a value system. He feels that the evaluator should not become a surrogate decision maker without revealing to others the values or value systems to which he is responding. Communication between the evaluator and his audience(s) is vastly improved if the communicator speaks the language and responds to the value system of his audience. Thus Stake emphasizes the role of the evaluator as facilitator rather than as a deliverer of insights.

The ultimate effect of increased communication is improved utility of the evaluation. Although there is some discussion in the literature concerning just what is meant by evaluation "utilization" (Daillak, 1982; Rutman, 1982), the normal layman's use of the term seems acceptable to most writers. In accordance with Stake's perspective, Weiss (1973) states that "Research focussed on pressing information needs will stand a better chance of being usable and used" (p. 1). In a previous article Weiss (1972) also states that "unless (the evaluation) gains serious hearing when program decisions are made, it fails in its major purpose" (p. 318). Also on the same topic, Braskamp and Brown (1980) quote Cronbach (1977) as saying,

> Since evaluation is a political and managerial activity, it should be judged by the extent to which policy makers and other relevant people are made aware of the merits and shortcomings of the evaluated program. (p. vii)

Thus any activity that would increase the communication with such relevant people, and thus increase utilization would seem to be a good thing.

The thinking of Robert Stake seems to have undergone a change over the years. He first became well known for his "Countenance" model of evaluation (Stake, 1967). The Countenance model was somewhat oriented toward the scientific research paradigm and had, as its major concern, the types of information to be included in an evaluation. The information was categorized and the categories were arranged in matrices which defined their relation to each other. Stake indicates that his thinking has not changed except that he now places more emphasis on the process of the evaluation (Braskamp and Morrison, 1975). A further change in his thinking, however, would seem to do with the types of information needed in an evaluation study. Although Stake advocates the collection of numerous types of information, he has increasingly leaned away from "the type of information one gets from a conventional evaluation study"; for example he talks about the "wastefulness of getting student performance data" (Braskamp and Morrison, 1975). This would seem to be drawing him away from the standard scientific paradigm of educational evaluation.

Stake has increasingly used methods such as detailed portrayals, as in his evaluation of the TCITY program (Stake and Gjerde, 1971), and case studies as in the large study of science education in the U.S. (Stake and Easley, 1978), but he emphasizes the use of methods chosen in consultation with the audience (Stake and Pearsol, 1981). "The responsive approach is an attempt to respond to the natural ways in which people assimilate information and arrive at understanding" (Stake, 1975 p. 23).

It is this orientation on humanism and naturalism that has caused some authors to place Stake's Responsive evaluation model in the "Naturalistic" enquiry category.

Naturalistic Enquiry

Naturalistic enquiry methods are based on a specific understanding of the way that human beings come to accept as "truth" or "knowledge" the input that comes from their surroundings. As explained by Guba (1978), in the traditional "scientific" paradigm of investigation, such as that used by physics, engineering, etc., knowledge is arrived at by separating out "variables" of any subsystem and testing the operation of a variable by holding everything else in the subsystem constant while that variable is altered. By working successively with different variables, the enquirer begins to converge on the "truth" by establishing relationships between the variables. A naturalistic enquirer however does not assume one ultimate "truth" to a system, but rather multiple truths each interacting with each other in intricate patterns. The naturalistic enquirer searches out these patterns, not for the sake of prediction and wider generalization as would the scientific investigator, but rather for the sake of "understanding" the existing situation.

Amongst many arguments, Guba proposes that the naturalistic enquiry method is much more adaptable to social behaviour phenomena (i.e. education) than the scientific paradigm since one is not really able to properly isolate independent and dependent variables in a social behaviour setting. This, he says, is why predicted generalizations of the scientific methods so often fail in an educational setting.

Guba says the naturalistic enquiry method does not necessarily call for qualitative rather than quantitative data, although qualitative methods are more prevalent. However Stake (1978a) does make a case for increased subjectivity rather than objectivity as a means for gathering and using evaluative information. Stake (1978b) makes similar arguments to Guba's in favouring naturalistic methods, but bases his reasoning on the way in which human beings absorb information. He says that the way most people "learn" or accept information on a daily basis is by "naturalistic generalization". In other words truths are developed in a person as a product of successive experiences (which may be of many different informal types), rather than by scientific induction.

Naturalistic enquiry methods generally borrow techniques of observation from the natural sciences. Field study is the fundamental technique of obtaining information. The use of ethnographic models of enquiry, borrowed from the field of anthropology, is a typical example. In this regard, Chafin (1981) talks about the evaluator acting as a "participant observer" in the program being evaluated. The investigation unfolds through a pattern of intensive interaction between the program and the evaluator. There is an element of continuous informal feedback given from the evaluator to the program participants and evaluation audience. The evaluator also uses techniques borrowed from ethnography in order to get close to the program participants and thus obtain intimate information.

An example of an anthropological evaluation is that of Smith and Pohland (1974). The authors evaluated a large scale CMI program in the Rural Highlands of Virginia. Their technique involved taking detailed descriptions recorded daily, on site, in field notes. Issues to be pursued arose during the evaluation, and were handled using the same techniques.

Advantages of naturalistic techniques are varied. Alkin (1980) states that they provide a procedure for concentrating precisely on the unfolding processes that result in observable outcomes.

> outcome events less often appear as surprises and more often have identifiable histories and can be seen as the understandable product of a sequence of actions and events. (p. 22)

Authors recognize that naturalistic procedures are less likely to be acceptable to those who prefer "scientific" studies (e.g. Smith and Pohland, 1974). However Cronbach (1980) states that,

> Much that is written on evaluation recommends some one 'scientifically rigorous' plan. Evaluations should, however, take many forms, and less rigorous approaches have value in many circumstances. (p. 7)

Similarly, Stake (1975), defends his perspective by saying that "it trades off some measurement precision in order to increase the usefulness of the findings to persons in and around the program" (p. 14).

Evaluation of Evaluation Methods

As noted previously, there has been a proliferation of educational evaluation methods, models and techniques. Smith (1982a) indicates that evaluators have explored many disciplines to find new perspectives and tools for evaluation. In addition to anthropology as discussed earlier, he lists geography, law, history, art and journalism as only a sample. In addition to this, many evaluators, when actually performing an evaluation, use what may be called an "eclectic" approach to evaluation, choosing bits and pieces from various approaches and using their professional experience to decide how to procede in a specific evaluation. For example, Worthen (1981), calling himself an "eclectic evaluator", uses what he calls the "multiple method" approach to evaluation in which he uses various methods to obtain various types of information in order to "triangulate" or zero-in on an evaluation finding.

As a result of the myriad of methods and approaches, it is difficult, especially for the novice evaluator, to know how to choose an effective technique. The advice of some authorities encourages a divergence of styles, rather than a convergence on "the" appropriate method. Cronbach (1980) states:

> The evaluator will be wise not to declare allegiance to either a quantitative-manipulative-summative methodology or a qualitative-naturalistic-descriptive methodology. He can draw on both styles at appropriate times and in appropriate amounts. Those who advocate an evaluation plan devoid of one kind of information of the other carry the burden of justifying such a conclusion. (p. 223)

In attempts to clarify the situation, some writers have advocated the evaluation of different evaluation techniques to provide some comparative information. Michael Scriven (1969) introduced the idea of Meta-Evaluation as a type of second order evaluation in which the primary evaluation (perhaps still in progress) is considered with a critical eye. His purpose was to try to increase the credibility of the primary evaluation. More recently, Smith (1982a,1982b) has offered some approaches for evaluating new methods of evaluation. His techniques involve a meta-evaluation type of approach in which the evaluation is studied as it proceeds. He offers variables to be tested and methods of testing. What he seems to suggest is that long term methodical testing of evaluation approaches and techniques will help refine evaluation practice and provide practicioners with a sound basis for decisions about choice of techniques.

An example of meta-evaluation is a study performed by Manuel (1976). In the study, Manuel evaluated a system of evaluation which had been used to assess some in-service training programs offered at the Northern Alberta Institute of Technology. The primary evaluation method was an application of Stake's Countenance model. Manual made an assessment of the success of the evaluation model by asking a panel of experts to apply some previously selected criteria. Stake's model was found to be effective in this instance.

It is apparent that the information resulting from meta-evaluation tends to provide data about techniques that have already been used, and used in a specific situation. Thus meta-evaluation results can only be generalized with extreme care to not-yet-tried evaluation designs. However many of the authors previously discussed, such as Stake, Cronbach, Worthen and others recommend tailoring the evaluation to each new evaluation context. From such a perspective, the use of meta-evaluation would appear to be limited.

One approach that has been taken to alleviate this difficulty is to establish standards to apply to evaluation studies. As stated by Smith (1982c),

> the purpose of an evaluation design is merely the presence of certain qualities in an evaluation - qualities which are valued by those in the evaluation process. (p. 229)

This review has found three recent attempts to compile a comprehensive set of standards for educational evaluation: that of N.L. Smith (1982c) of the Northwest Regional Educational Laboratory; that of the Evaluation Research Society (E.R.S.) (Anderson, 1982); and that of the Joint Committee on Standards for Educational Evaluation (1981). The work of the Joint Committee was the largest undertaking of the three - taking five years and involving the contributions of approximately two hundred evaluation experts in national (U.S.) hearings. The three efforts have produced similar results. Smith (1982c) notes that his results are similar to, though simpler than, the standards of the Joint Committee. Both Rossi (1982) of the E.R.S. and Stufflebeam (1982) of the Joint Committee (he was chairman of the committee) have stated that the E.R.S. results are substantially the same as the Joint Committee results. Further, since the E.R.S. standards were designed for a wider audience than just educational evaluators (Anderson, 1982) only the Joint Committee standards will be discussed here.

Ridings and Stufflebeam (1981) state that the word "standards" in the Joint Committee work refers to "widely shared principles for assessing the quality of an evaluation" (p. 7). The Joint Committee developed 30 standards grouped according to four major attributes of an evaluation - its utility, its feasibility, its propriety and its accuracy.

Ridings and Stufflebeam describe the four major attributes as follows:

The utility standards concern the responsiveness of the evaluator to his audience. He must acquaint himself with his audience and the audience's needs. He must report the information clearly and when it is needed.

The feasibility standards are concerned with having an evaluation that is cost effective and workable in a real-world setting. The evaluation should be realistic, prudent, diplomatic, politically viable, and frugal.

The propriety standards recognize the multitude of effects that evaluations have on people. The rights of persons must be protected. An evaluation must be conducted legally, ethically, and with due regard for the welfare of those involved in the evaluation as well as those affected by the results.

The accuracy standards relate to the evaluation's overall validity. They determine whether the evaluation has produced sound information, whether the obtained information is technically adequate and whether conclusions are linked logically to the data.

The Joint Committee has presented the standards in a book titled "Standards for Evaluations of Educational Programs, Projects and Materials." As well as a description and rational for each standard, the book provides guidelines for the application of the standard, common mistakes to be avoided in applying the standard, and caveats concerning the results of being too zealous with respect to the standard, and an illustration of the use of it.

One overall caution as provided by Smith (1982c) is that the standards are interactive and that sometimes one can only be achieved at the expense of another. Ridings and Stufflebeam (1981) note that although all the standards apply to all evaluations, some may be more relevant than others in a particular evaluation.

Summary - Educational Evaluation

In summary, a review of the literature shows that there are many different models and methodologies proposed for educational evaluation. Some models and perspectives which seemed relevant to the present study have been discussed. The "CIPP" model of Stufflebeam and others provides a definition of evaluation as the process of providing useful information to decision makers. Responsive evaluation places emphasis on the "issues" of the evaluation as defined by the audience. Naturalistic enquiry leans away from traditional "scientific" types of investigation. It leans more towards the techniques of the natural sciences, such as field study and case study techniques in which the researcher may interact more intimately with the environment being studied. Various authors advocate choosing evaluation strategies and techniques in a flexible manner to suit the situation of the evaluation. Recent studies by the Joint Committee on Standards for Educational Evaluation have proposed standards which can be applied to any evaluation regardless of model or technique.

Adult Basic Education

Adult Basic Education (ABE) has been defined by Cass (1970) as education which offers:

> ...an opportunity to obtain those minimal skills needed if an individual is to function by himself with very little assistance from others. (p. 11)

During the past twenty years, words such as these have been interpreted to mean completion of the equivalent of grade 8 or 9. (The Adult Basic Education departments at the AVC's in Alberta have not been exceptions. In Edmonton, the ABE department is charged with instruction up to the equivalent of grade 9.) As a result of this high school equivalency, the curriculum taught in ABE programs has normally contained the types of topics found during the years of schooling up to grade 8 or 9, with emphasis on the "basics": reading, writing and mathematics.

Although curriculae of this nature are useful if the student is ultimately intent on obtaining a high school certificate, or in writing a high school equivalency exam such as the G.E.D. (General Education High School Equivalency Test), there are some difficulties in assuming that the type of definition given by Cass can be served by a high school equivalency. Kirsh and Guthrie (1977) state that while measures such as year of school completion and grade level equivalency scores can be shown to have some utility for young persons, they may not describe the skills that a marginally competent or literate adult needs in today's society. The concept is also discussed by Audrey Thomas (1976) in the study "Adult Basic Education and Literacy Activities in Canada, 1975-76."

Thomas said on one hand that it is possible that a person who cannot read and write may be able to function very well in life because he has developed the means of hiding his illiteracy. On the other hand, a man with an advanced university degree may be "illiterate" when it comes to expressing and sharing his emotions if he has not been exposed to the language of feelings. Thomas suggested that "in terms of functioning, it is probably better to move towards some kind of measurement of task performance" (p. 7), and indicated a need for skills such as problem solving, interpersonal skills, and work related skills (other than vocational skills).

A recognition that there is a difference between the "basic" skills (such as reading, writing and arithmetic) and "functional" skills has resulted in much effort to define and clarify the differences. Consequently, the literature on ABE uses certain terms and concepts which should be discussed here.

Terminology

In the context of ABE, the terms "literate" and "illiterate" can have expanded connotations over those normally used. Kasworm (1980) discusses the evolution of these connotations in the U.S. Literacy originally meant the ability of a person to read or write in his native language. Then in the 1950's, the term was expanded to mean the completion of fifth-grade level of skills. By the 1970's, the term had come to mean "at least the completion of secondary school". (p. 2)

A parallel term is "functional literacy". Kirsh and Guthrie (1977) note a lack of agreement in the literature over the meaning of this term, and list a few of the definitions available. One representative definition is that used by the Northwest Regional Educational Laboratory (1976, p. 20). They define functional literacy as "the ability to engage effectively in all those reading activities normally expected of a literate adult in his community." Although circular, this definition does serve to represent functional literacy in terms of reading demands required by society, and does not tie the definition into a school equivalency.

The demands made by society figure prominently in the use of the term "life skill". As stated by Kasworm, life skills competencies tend to focus on life roles such as "employee, consumer, citizen, family member, healthy individual, and/or personal problem solver." (Kasworm, 1980, p. 5) The Training Research and Development Station (TRDS) in Prince Albert, Saskatchewan used a definition of life skills as "problem solving behaviours responsibly and appropriately used in the management of personal affairs." (Training Research and Development Station, 1973, p. 4)

The authors (TRDS) expand their definition by designating learning experiences for adults in the following areas:

1. Developing Oneself and Relating to Others
2. Coping with Home and Family Responsibilities
3. Using Leisure Time Purposefully
4. Exercising Rights and Responsibilities in the Community
5. Making Responsible Decisions for Work Future.

Thus there can be a distinction made between "basic" skills and "life" skills as described above. Various ABE programs may contain mixes of both. In a study on adult education published by Alberta's Department of Advanced Education and Manpower (Alberta, 1978), it was stated: "Adult Basic Education implies adult participation in learning programs of a kind normally undertaken in youth, 'the three R's', to which is sometimes coupled a basic occupational credential." (p. 10)

From the above perspectives then, part of the information produced by the present study indicated, in a tangential manner, the amount of life skill competencies being offered along with "the three R's" in part of the ABE curriculum at AVC Edmonton.

Life Skills Curriculae

The inclusion of life skills type competencies in school curriculae has been advocated by proponents of "life long" learning, i.e. those who feel that education should not be limited by a perspective which places it only into traditional institutions, and which assumes that it stops when a student leaves the institution, whether that institution is high school, college, etc. Life long learning, and thus the life skills curriculum it implies, has been advocated both for youth by Olsen and Clark (1977) and for adults by Knowles (1980).

Problems certainly may arise in trying to bring life skills instruction into an ABE program, or in trying to perform life skills instruction in any institution in any situation. Some of the attempts to use the life skills program designed by the Training Research and Development Station have been documented in a compendium of evaluations (Training Research and Development Station, 1974). Some of the problems noted were specific to that particular program, but some were applicable to life skills instruction in general. Among these:

> - Adult students have many prior years of a set way of life and accumulated and reinforced ineffective behaviours.
>
> - The aim of the course is to change the behaviour of students in areas of life highly resistant to change since they imply and require changes in self-concept and long standing habits of thought, feeling and action.
>
> - The changes must not be confined to training but must transfer to the lives of students outside and after training ... it might be necessary to change the total interpersonal context of the student to achieve the desired goal.
>
> - The amount of control the training setting has over the students is rather low when compared to the students' general life situation.
>
> - To the extent a typical school-learning model is used it will fail. The model must be behaviour change. Thus, trying to deal with all problems in all areas of life will lessen the possibility of producing a fundamental change in some areas for some students. There is a danger of trying too much instead of focusing on one problematic area. (pp. 2-3)

A further problem is one of relevancy to the learner. As stated by Knowles (1978) a major characteristic of many adult learners is that they are very goal oriented. Life skills instruction may or may not be perceived by such a learner as being of immediate use. Mezirow, Darkenwald and Knox (1975) in their book "Last Gamble on Education" document the desperation of many disadvantaged adults in coming to ABE programs in the hope of, ultimately, obtaining employment closed to them due to their lack of academic credentials. The authors found little evidence of the teaching of life skills in their survey of ABE classes in the U.S.

Mezirow, Darkenwald and Knox did, however, recommend the incorporation of "life skills" instruction into ABE for the reason that not all students that are attending need to obtain all that is implied in a grade 8 or 9 education, and many seriously require some life skills kinds of instruction. While this present literature review did not find any instances of authors saying that life skills or functional skills instruction should not be included in ABE programs, support for inclusion is found in different areas. Hoare (1982) carried out an in-depth study of adult education and related literature for the decade of 1970 to delineate the predominant future issues that emerged from that period. The author discovered a need for attention to be given to the following areas, most of which can be seen to relate to life skills types of considerations: education for work and leisure, aging, health, functional competency, social and civic responsibility, personal adaptation, education for teachers of adults, and continuing professional adaptation. (The author discussed the area of "functional competency" specifically in the context of ABE.)

In 1976, Unesco adopted a "Recommendation on the Development of Adult Education" (Canadian Commission for Unesco, 1980). The recommendation advocated life long learning, and in its discussion of the content of adult education said in part:

> With regards to such persons or groups as have remained illiterate or are experiencing difficulty in adjusting to society because of the slenderness of their resources, their limited education or their restricted participation in community life, adult education activities should be designed not only to enable them to acquire basic knowledge (reading, writing, arithmetic, basic understanding of natural and social phenomena), but also to make it easier for them to engage in productive work, to promote their self-awareness and their grasp of the problems of hygiene, health, household management and the upbringing of children, and to enhance their autonomy and increase their participation in community life. (p. 6)

Competency Based Adult Education

In response to the above considerations, there are many examples of programs which attempt to combine basic skills with life skills instruction. Internationally, programs have existed, for instance, in India (India Literacy House, 1969) and Tanzania (Bhola, 1970). In Canada, the Training Research and Development Station programs mentioned earlier in this review are examples.

One development which has occurred during the last decade is that of Competency Based Adult Education (CBAE). CBAE represents an attempt to find out just exactly what adults in society do need to know, and to create programs to teach the skills so identified. Nickse (1980) reports a definition of CBAE which was accepted at the U.S. National Invititational Workshop on Adult Competency Education in 1978:

> Competency-Based Adult Education (CBAE) is a performance-based process leading to demonstrated mastery of basic and life skills necessary for the individual to function proficiently in society. (p. 2)

Parker and Taylor (1980) explain the central aspects of this definition as follows:

> 1. Performance Based Processes - some behaviour or direct action is undertaken by the learner; learner responsibility is fostered in identifying goals, and the methods, techniques, and strategies required to achieve these goals.
>
> 2. Demonstrated Mastery - in a CBAE activity, this is the link between the performance process and the predetermined basic or life skill objective.
>
> 3. Basic and Life skills - a distinction here made between primarily cognitive skills such as reading and mathematics, and life skills which apply to specific life roles - a more humanistic concern.
>
> 4. Function proficiently in society - the term "proficiently" is used to connote progress in accomodating to changes in societal demands; society simply means association with others. (p. 13)

The best known examples of CBAE in North America are the Adult Performance Level (APL) project of the University of

Texas (Shelton, 1979) and the "California" study (NOMOS, 1978). The APL project was a federally funded project designed to identify, using extensive surveys, the functional literacy skills required of adults across the U.S. The California study was a state funded project primarily aimed at determining the needs of certain minority groups in California. Research for this literature review, and efforts by the Adult Basic Skills project staff have discovered no instances of CBAE development in Canada prior to the ABS project.

Mathematics Skills in Life Skills Programs

The manner in which mathematics skills are taught in life skills programs varies depending on the basic framework of the program. At one end of the spectrum are programs which have been implemented while attempting to use as a framework the traditional high school subject areas (reading, writing, mathematics etc.) At the other end of the spectrum are programs such as CBAE programs which use as organizers the life skills competency areas (such as Consumer Economics, Health etc.). Kasworm (1980) indicates that the choices of different frameworks may be due to philosophical differences in program structure or in adult learning styles, the resources available to the project, and the desired outcomes of the program. Specific to the last of these could be whether the program is being used to provide entry skills for a traditional high school program or other higher education programs.

The Adult Performance Level project produced functional competencies or "coping skills" in the areas of communication (reading, writing, and listening), computation, problem solving and interpersonal relations. These skills were applied in "life-coping situations" or "knowledge areas" (consumer economics, occupational knowledge, community resources, health, and government and law).

Instructional materials based on APL have used the "knowledge areas" as the organizer. An example of these materials is "The Adult Performance Level Competency-Based High School Diploma Program" (Shelton, 1979). In the series of texts produced for this program by Harcourt Brace Jovanovich (Adult Performance Level, 1979), students deal with one knowledge area at a time, such as Consumer Economics. Each section of text, for example "Counting and Currency", has a pre-test. If the pre-test indicates weakness in some area of mathematics, for example whole number arithmetic, then the student works through a learning section dealing specifically with whole number arithmetic before coming back to work on "Counting and Currency". The whole number section is phrased specifically in terms of counting money, so as to provide specific preparation for the section coming up. There is not a "Mathematics" section in the APL competency list which defines computation skills, although from Shelton's description (1979), the project does seem to have gone through a stage early in its development when such a section did exist.

An example of the other end of the spectrum in program format is the text series that was used by the ABE department at AVC Edmonton at the time of this study. The text series titled "Essential Mathematics for Life" (Charuhas et al, 1981) introduces life skills competencies as the student works his way up through the traditional mathematics competencies. The emphasis in each section is on mathematics, for instance "Adding Change" is part of the lesson on "Simple Adding". These texts also involve exercise section consisting of computations involving numbers only without a life skills context. The APL series does not have exercises of this type.

The "Essential Mathematics for Life" series as used by AVC does not include higher level mathematics topics such as simple algebra, or how to construct (as opposed to reading only) graphs. However, in programs using traditional mathematics as the organizer, it is more common to see higher level competencies included. This is probably because such programs may be conceived with a "high school equivalence" philosophy. An example of this is the "LINC" program (Learning Individualized for Canadians) designed by the Training Research and Development Station (Saskatchewan Newstart) in Prince Albert Saskatchewan (Training Research and Development Station, 1972). Linc includes topics such as "statistics" which includes competencies involving construction of various types of graphs, and a section on Introductory Algebra.

Using the foregoing definitions of "basic" and "life" skills, the Adult Basic Skills listing (Collett, Deane, Kendall and Brooks, 1983) contains mathematics skills in a number of different ways. First, there is a section entitled "Mathematics" which contains both "basic" mathematics skills, e.g. "Write Numbers", and mathematics skills phrased in terms of life skills, e.g. "Make monetary change". (In Appendix A which contains the skills used in the present study, the first 20 skills comprise the "Mathematics" section of ABS.) Second, there are other life skills competencies requiring mathematics skills, e.g. "Manage finances for family". These competencies are contained throughout the remaining 10 sections (e.g. Earn a Living, Function as a Citizen etc.) of the listing. This overall structure represents a combination of the APL and TRDS types described above, although a curriculum has not yet been developed using ABS as a basis.

Summary - Adult Basic Education

In summary, a review of the literature pertaining to Adult Basic Education (ABE) has indicated that although the content of ABE programs have historically been oriented towards giving students the equivalent of a grade 8 or 9 education, educators have identified adult educational needs outside of the traditional school offerings. There has been shown to be a difference between "basic" skills, such as the "three-R"s", and "functional" or "life" skills such as those skills pertaining to the student as consumer, citizen and family member.

Although there are advocates of life skills instruction from both the theoretical and practical areas of education, examples of the use of life skills programs have shown that the effective delivery of life skills programs to adults presents problems based, for examples, on the immediate needs of the adult or on his home environment. In response to these difficulties, Competency Based Adult Education (CBAE) has attempted to implement individualized competency based instruction using, as foundations, systematic investigations into the skills needs of the adult learner.

The content and presentation of mathematics curriculae in Adult Basic Education life skills programs varies according to the underlying philosophy of the ABE program, whether leaning towards CBAE or towards the traditional high school curriculum. Traditionally oriented programs may include more complex mathematics skills than CBAE programs; also CBAE derived curriculae may organize learning experiences according to the life skills aspects, treating mathematics as a necessary, but not specifically emphasized aspect of those life skills.

CHAPTER THREE

INSTRUMENTATION AND METHODOLOGY

This study was conducted to determine how much change would be likely to occur if the mathematics oriented skills from the Adult Basic Skills (ABS) listing were to be incorporated into the mathematics program in the Adult Basic Education (ABE) department at the Alberta Vocational Centre (AVC) in Edmonton. The study used a combination of an examination of program records, interviews with the ABE mathematics instructors and a card sort performed by the instructors, which was designed to determine the extent to which the ABS skills were already being taught in the ABE program.

This chapter will discuss the research methodology and instrumentation used in the study, and is presented in three main sections.

First, this chapter includes a description of the overall design of the study. This description also related the design to the results of the literature review on educational evaluation as presented in the previous chapter.

Second, the chapter includes a review of the literature which was conducted with respect to relevant information gathering techniques. This survey sought instances of similar studies and details on instrument construction and use.

Third, this chapter includes a chronological description of the steps taken in the procedure of the study. This last section is organized as follows:

- Discussions with ABE Mathematics Senior Instructor and ABS Project Directors
- Permission Requested to Perform the Study
- Identification of ABS Mathematics Skills
- Examination of ABE Mathematics Program Records
- Card Sort Design
- Interview Design
- Pilot Testing of Instruments
- Implementation of Instruments
- Data Analysis

Design of the Study

The results of the literature review in educational evaluation as presented in the previous chapter were used as a basis for the design of the methodology of the study. It was felt by the researcher that an investigation conducted in a "responsive" manner would be appropriate. In a responsive type of evaluation, the views and concerns of the stakeholders, i.e. those directly affected by the study, form the basis of the questions asked and information sought. This consideration supported the extensive use of the mathematics instructors as sources of information, and lead to the inclusion in the study of discussions with ABS project directors and the ABE mathematics program director.

As a result of such discussions, "naturalistic" techniques of information gathering were chosen. The study was oriented towards a "case study" format involving close contact between the researcher and the people working in the existing ABE program. This perspective was the basis for the choice of in-depth interviews as the primary source of data for the study. From a naturalistic perspective, the study was thus conceived as a study of some aspects of the relationship between the Adult Basic Skills mathematics skills and the existing ABE mathematics curriculum at the AVC in Edmonton.

Included in the study was each ABE mathematics instructor who had taught all the mathematics courses in the program. Since all seven full time ABE mathematics instructors had taught all the courses, all were included in the study. This number included the Senior Instructor of the mathematics program. Information gathering techniques were chosen to optimize the amount and quality of information that could be gained from the small number of instructors.

The use of the case study approach facilitated this activity.

Overall, three sources of information were used:

1. An examination of course records and texts
2. A card sort of the ABS mathematics skills, performed by the instructors
3. Semi-structured interviews with the instructors

In terms of the presentation of information and the type of information ultimately presented by the study, the researcher was also guided by the perspective and definition of the CIPP evaluation construct. The investigation was thus aimed at providing "useful information" to decision makers, in this case future curriculum designers in the Alberta Vocational Centre, as well as the stakeholders as mentioned above.

Information Gathering Techniques

During the performance of the present study, the literature was consulted with regard to information gathering techniques which might be compatible with the environment, purpose and conceptual framework of the study. A search of the literature did not find instances of studies where the curriculum development process had contained a comparative examination of an existing curriculum as in the present study. However theoretical support was found for using instructors' knowledge in the development process, and two instances where this had been done.

In an article on curriculum development, Connelly (1972) has stated:

> The curriculum developer cannot assign, let alone account for, the full range of teaching situations that arise. It is here that the teacher's experience and wisdom enter into curriculum planning in a way that cannot adequately be replaced. (p. 64)

Sabar and Miron (1979) used a curriculum development process which included the use of input from teachers of a program similar to the one being developed. The study was designed to analyze the value of the teachers' contributions to the curriculum development process. The authors concluded:

> There is no substitute for [teachers'] contributions to curriculum development, for their special knowledge of pupils and first hand experience which may be used to obtain feedback of great importance. (p. 207)

The authors obtained information from teachers using three methods:

1. Classroom observation of the new curriculum in use
2. Individual interviews with the teachers
3. Teacher responses to a questionnaire relating to the new curriculum. Amongst other questions, the survey sought suggestions for modifications.

In relation to the present study, the ABS information was not sufficiently developed to allow use of the first of these three methods, but the general approach of methods 2 and 3 was adopted.

Due to the small number of AVC instructors involved in the study, the interview was chosen as the major source of information. To support the interview, a card sort procedure, based on the Q-Methodology of Stephenson (1953) (commonly known as the "Q-Sort") was used. Although the Q-Methodology per se was not used, studies using a Q-Sort were consulted to aid in the design of the card sort for the present study. The studies by Collett (1969), Woloshyn (1973) and Juthner (1978) were consulted, the latter particularly because the author used the Q-Sort to obtain feedback on statements describing an existing curriculum.

It was envisaged that the purposes of the interviews conducted with the instructors would be to elicit the instructors' feelings about the ABS mathematics skills, their feelings about the ABS listing as a whole, and their perceptions about the possibility of incorporating the ABS mathematics skills into the ABE mathematics program. Udinsky, Osterlind and Lynch (1981) discussed the advantages and disadvantages of the use of interviews in comparison to other types of instruments. The authors noted that interviews may produce data that can be difficult to quantify, and in some studies the time required to perform the interviews may be significant. The interview process would open the study to a number of biases, among these: the interviewer's biases, the respondents' biases, and biases due to the environment of the interview. On the other hand, the authors stated that a basic characteristic of the interview is its ability to gather and analyze large amounts of data from small numbers of respondents, and the process allows the possibility of uncovering information that might not otherwise be forthcoming.

In discussing interview design, McCallon and McCray (1975) described the reasons for choosing between a structured and unstructured format. The unstructured format allows deeper probing of the topic and is "most appropriate for conducting explorations to gain deeper and broader insight into a particular situation" (p. 4). However as noted by Udinsky, Osterlind and Lynch (1981) the totally unstructured interview is most open to biases and is the least amenable to analysis. Merton, Fiske and Kendall (1956) suggested the use of an interview guide, but stressed that it was important that the guide not be followed too rigidly, for if the interviewer confined himself too closely to areas set forth in advance, he might ignore important hints which could extend the range of the interview. The guide therefore, should be treated as a flexible tool, which allows the interviewer to respond to cues and implications contained in responses provided. Based on these considerations, a semi-structured format was chosen for the present study.

Guidelines for selection and ordering of questions were provided by McCallon and McCray (1975). As to question ordering, the authors recommended that the interview begin with emotionally neutral questions, gradually moving towards more sensitive issues. Udinsky, Osterlind and Lynch (1981) also suggest a sequence of simple to complex questions. Both sets of authors emphasize careful choice of wording of questions to avoid ambiguity, and the avoidance of "leading" questions.

Gorden (1975) has made a detailed study of the dynamics of the interviewing process, based on the perspective that interviewing is a form of communication involving the triad of interviewer, interviewee, and topic of discussion. The author advocates the use of certain verbal techniques to motivate answers: providing context with the question, selecting appropriate wording, defining the scope of the question and the use of closed questions to help structure relevant responses. Gorden also advocates careful attention to non-verbal cues and stimulae on the part of both interviewer and interviewee.

Procedure of the Study

Discussions with ABE Senior Mathematics Instructor and ABS Project Directors

In keeping with the model of this study as a responsive evaluation, discussions were held prior to instrument design with those parties who would be directly affected by the study itself. Specifically, the directors of the ABS project and the senior instructor of the ABE mathematics program were interviewed to determine their concerns about the ABS listing, especially with respect to the mathematics skills contained in the listing. These interviews were required to give the researcher sufficient background information about the ABE mathematics program and the ABS skills.

Permission Requested to Perform Study

Formal permission to proceed with the study was sought from the President of AVC in Edmonton. Appendix B contains the letter of request and the resulting letter of approval. In addition, approval to use the ABS project results had been received from the ABE Steering Committee and the Director of Field Services of the Department of Advanced Education and Manpower, under whose auspices the ABS study had been conducted.

Identification of ABS Mathematics Skills

The Adult Basic Skills listing contains some skills which are directly mathematical, for example "Write Numbers". The listing also contains skills which require mathematics skills to perform, for example "Manage Finances for Family". Both types of skills were included in the study.

The ABS listing is structured such that some of both of the above types of skills are contained in a section entitled "Mathematics". The contents of this section was included in the study in its entirety. The other ten sections of the ABS listing ("Earn a Living", "Function as a Citizen", etc.) were inspected by the researcher for skills involving mathematics. Relying on previous academic experience in mathematics, previous experience as a mathematics instructor, and previous involvement in the ABS development project, the researcher selected all skills from the ABS listing which required mathematics abilities to perform. The selection resulted in a total of 68 skills, including those from the "Mathematics" section of ABS. The resulting skills are listed in Appendix A, along with their original reference numbers from the ABS listing.

A close inspection of the ABS listing would reveal additional skills which might, arguably, have been included in the listing in Appendix A. Possibly, for example, any skill involving finances might be considered to require mathematics skills. However, skills were not included in the study where, in the opinion of the researcher, the connection with mathematics was tenuous. An example of a skill not included in the study for this reason was "Demand cost estimate in writing for goods and services."

Examination of ABE Mathematics Program Records

The following documentation was obtained from the ABE department:

1. A description of the ABE mathematics program
2. Individual course descriptions
3. Course texts

The written description of the ABE mathematics program included course sequencing for different types of students and the general aims of the program.

The individual course descriptions were those used by the mathematics program instructors. They included general descriptions of each course and some loosely structured course objectives for each course.

The course texts were those currently in use.

The program records, bolstered by the discussions with the senior instructor of the ABE mathematics program were used to construct a description of the mathematics program. A list of skills included in the program was compiled by the researcher from the course descriptions and the course texts. The resulting list of skills was used as an aid to the design of the card sort and interview questions.

Card Sort Design

The purpose of the card sort was to establish the extent to which each of the ABS mathematics skills was being taught in the ABE mathematics program. In addition, the card sort was used as an integral part of the instructor interviews in order to familiarize the instructors with the ABS mathematics skills and to provide a springboard for discussion. Each of the cards contained one of the ABS mathematics skills, and the instructors were able to isolate their consideration of each skill by considering one card at a time.

It was suspected by the researcher that the manner in which the ABS mathematics skills were taught might vary depending on whether the skill involved mathematics directly, as in the skill "Write Numbers" or whether it involved mathematics as only one aspect of the skill, as in the skill "Estimate Food Costs". It seemed possible in the latter type of skill that the "life skills" aspect, in this case food costs, might be lightly treated simply as an environment in which to teach addition, subtraction, etc. If so, knowledge of such treatment would be information worth considering in determining the "extent" to which a skill was taught in the mathematics program. Although in some cases it might seem clear as to which of the above two types a skill belonged, instructors might differ in their opinions on this matter and thus, potentially, in their in-class treatment of the skill. Consequently the card sort needed to be designed to test which of the two types the instructors felt was applicable for each skill.

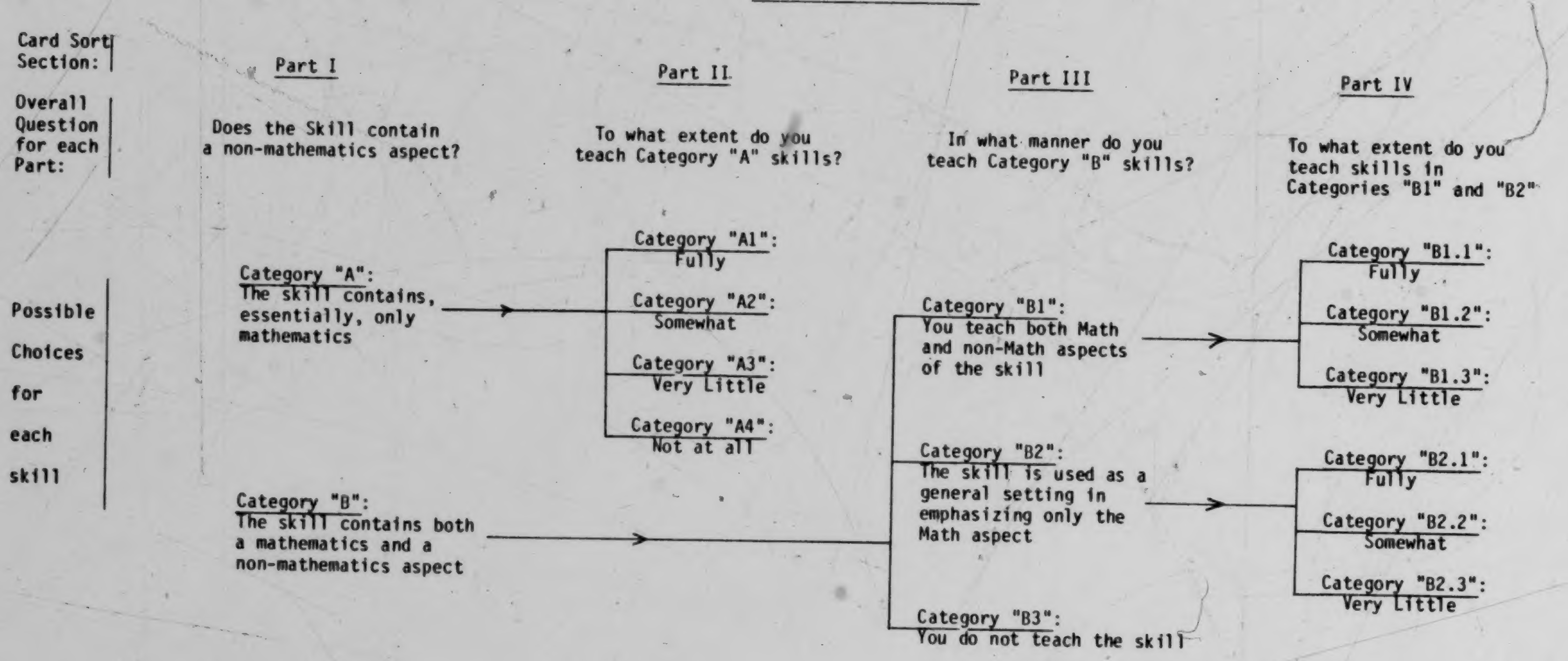
For this reason, a multi-stepped card sorting procedure involving four sequential parts was designed to isolate any skills taught in such a manner. The instructions used for the card sort are included in Appendix C. Figure 1 shows the choice route followed by the card sort. The instructor was presented with the 68 cards, each containing one ABS mathematics skill, and was asked to respond to the question in Part I of the sort by distributing the cards into piles corresponding to the possible answers provided. The instructor was then asked for any comments he or she might have on the activity just performed before proceeding to Part II of the sort. The same procedure was used for each of the four parts of the sort.

Interview Design

The interview questions, as included in Appendix D, were designed to elicit the instructors' feelings about the Adult

FIGURE I

CARD SORT CHOICE ROUTE


Card Sort Section:
Part I
Part II
Part III
Part IV
Overall Question for each Part:
Does the Skill contain a non-mathematics aspect?
To what extent do you teach Category "A" skills?
In what manner do you teach Category "B" skills?
To what extent do you teach skills in Categories "B1" and "B2"
Possible Choices for each skill
Category "A": The skill contains, essentially, only mathematics
Category "B": The skill contains both a mathematics and a non-mathematics aspect
Category "A1": Fully
Category "A2": Somewhat
Category "A3": Very Little
Category "A4": Not at all
Category "B1": You teach both Math and non-Math aspects of the skill
Category "B2": The skill is used as a general setting in emphasizing only the Math aspect
Category "B3": You do not teach the skill
Category "B1.1": Fully
Category "B1.2": Somewhat
Category "B1.3": Very Little
Category "B2.1": Fully
Category "B2.2": Somewhat
Category "B2.3": Very Little

NOTE: Each skill could ultimately have been placed in any one of 11 categories:
A1, A2, A3, A4,
B1.1, B1.2, B1.3, B1.4
B2.1, B2.2, B2.3, B2.4
B3

Basic Skills mathematics skills, the ABS listing as a whole, and their perceptions about the possibility of incorporating the ABS mathematics skills into the Adult Basic Education mathematics program. The content and underlying direction of the interview questions were based upon:

1. Discussions with Adult Basic Skills project staff
2. Past discussions with Adult Basic Education Steering Committee members
3. Discussions with the ABE mathematics program senior instructor
4. Analysis of ABE mathematics program records and texts
5. Analysis of the structure of the ABE mathematics program
6. Previous participation by the researcher in the ABS development project
7. Discussions with various ABE staff during the course of the ABS project

The interview format was designed to be semi-structured, whereby the questions as listed were used as the starting points for free and probing discussion on the topics concerned. The questions were not designed to be mutually exclusive, but were in some cases designed to elicit similar information from different perspectives. The six interview questions (presented in Appendix D) covered the following general topics:

1. The instructor's perceptions of the difference between the Adult Basic Skills mathematics skills and the ABE mathematics curriculum as it was being taught.
2. The adequacy of the ABS mathematics skills for Albertan adults.
3. Required changes at AVC Edmonton if the ABS mathematics skills were to be incorporated. Areas specifically questioned included resources, program structure, facilities, time and instruction activities.
4. The instructor's feelings as to whether the ABS listing should be used as the basis for curriculum change.
5. The instructor's overall suggestions for the curriculum change process.
6. Other comments.

Pilot Testing of Instruments

The card sort and the interview questions were pilot tested to see whether the instruments would elicit the kind of information desired, to see whether any of the questions asked were perceived as being ambiguous or irrelevant, and to determine the approximate time required for each respondent to complete the card sort and interview. The instruments were pilot tested by two individuals, with modifications being made to the instruments after each test. One individual was a mathematics instructor from a program similar to that taught in the ABE department at AVC; the second was a part time ABE mathematics instructor who had taught most, but not all, of the ABE mathematics courses and thus was not experienced enough to be included in the actual study.

Although no statistical analysis was feasible, the card sort results were tabulated for each pilot test and inspected to see whether the questions were being interpreted as expected. Comments made by the two instructors during and following the pilot tests were also used to refine the questions and procedures of the instruments.

Implementation of Card Sort and Interview

Pilot testing had established that approximately one hour was needed to perform the card sort and interview. Individual appointments were arranged with each instructor over a three day period. In order that the procedure would not be rushed, instructors were asked to give one to one and one half hours of time each. The instructors were very facilitative in making the necessary arrangements. The appointments were held in vacant offices, or in the instructor's own office in such a way that intrusions would not occur.

Prior to beginning each card sort and interview, the instructor was assured that all responses would be confidential. As mentioned previously in the section "Card Sort Design", the four parts of the card sort were not given to the instructor all at once. Each part was given out as the previous part was completed. This procedure made it possible to ask for comments from the instructor at the end of each part before proceeding with the next part of the card sort. This procedure also enabled a fluid transition from the card sort to the interview question.

Recording of interview responses was made using written notes during the interview. Time taken for each appointment ranged from 50 minutes to 2 hours.

Data Analysis

Analysis of the card sort responses was calculated by hand. Although the major purpose of the card sort was to determine the extent to which each skill was taught, an analysis was made of the responses in each part of the card sort. Using these analyses, an attempt was made to isolate specific skills or groups of skills that would be of interest to a curriculum developer. Resulting groups of skills included those skills which were rated as being taught to a greater or lesser extent, skills perceived as containing a non-mathematical component, and skills where the non-mathematical component was not emphasized during teaching.

Analysis of the interview results was performed by inspecting the results for topics of concern and interest (to the instructors) and then grouping the responses according to these topics.

Summary

This chapter has been presented in three sections: the underlying design of the study; a review of the literature pertinent to the instrumentation of the study; and a chronological description of the procedure of the study.

The design of the study has been described as requiring an investigation conducted in a "responsive" manner using "naturalistic" investigation procedures, specifically the case study format. Procedures for the study thus involved close contact with those involved with the existing ABE program. Sources of information for the investigation were ABE course records, a card sort (of the Adult Basic Skills mathematics skills) performed by the instructors, and semi-structured interviews with the instructors. The interviews were to be the predominant source of information.

A search of the literature was made pertaining to information gathering techniques relevant to the study. Although no studies were found that closely reflected the purpose of the present study, some instances of curriculum design evaluation were found that advocated the use of instructor feedback to the curriculum development process. Since it had been decided to use a card sort technique coupled with an interview to obtain data for the study, previous studies using card sorts were consulted to provide suggestions for preparation, and the literature pertaining to interviews was examined. Recommendations were found in the literature with respect to interview format, question construction and interview tactics.

Based upon the considerations contained in the first two sections of this chapter, the study was designed and performed. Discussions were held with the Adult Basic Skills project directors and the senior instructor of the ABE mathematics program to determine the concerns to be addressed by the study and to obtain needed background information. Formal permission was sought, and received, to perform the study. The mathematics skills to be included in the study were compiled from the ABS listing such that all skills requiring mathematics to perform were included in the study. The course descriptions and course texts as used by the Adult Basic Education department were then examined. The information resulting from this examination was used to aid construction of the card sort and interview.

Prior to implementation of the card sort and interview, these instruments were pilot tested by two instructors, one an instructor of a program similar to that at AVC, and one a part time instructor in the program at AVC. Modifications to the instruments were made as a result of the pilot testing.

The researcher met individually with each instructor during which meeting the card sort procedure was followed immediately by the interview. In the card sort, which was designed as an adjunct to the interview, each card in the sort contained one of the ABS mathematics skills, and the cards were sorted by each instructor into various piles in response to the sequential questions posed by the written instructions. The overall purpose of the questions in the sort was to determine the extent to which the ABS mathematics skills were already being taught in the existing Adult Basic Education curriculum.

The semi-structured interview was to be the major source of data for the study. Questions designed for the interview were used as the starting points for in-depth discussions. Topics covered by the questions concerned the instructor's feelings about the relationship between the ABS skills and his or her own current teachings, the adequacy of ABS, and possible changes at AVC should the Adult Basic Skills be incorporated into the curriculum in some way.

Analysis of the results of the card sort was performed to determine the extent to which the instructors felt each ABS skill was being taught, and to attempt to identify individual skills or groups of skills of interest to curriculum designers. Interview results were analyzed by inspecting for topics of concern to the instructors, and then grouping the instructors' comments according to those topics.

CHAPTER FOUR

PRESENTATION AND ANALYSIS OF RESULTS

As discussed in the previous chapter, this study used three sources for information: first, an examination of AVC program records pertaining to the existing ABE mathematics program; second, a card sort procedure designed to investigate the extent of teaching, in the existing curriculum, of each of the Adult Basic Skills mathematics skills; and third, semi-structured interviews with each of the ABE mathematics instructors.

To provide necessary background information, the first section of this chapter includes a brief description of the ABE mathematics program, compiled from discussions with ABE staff and the examination of program records.

The second section of this chapter discusses the results of the interviews. This section is placed before the section on the card sort since the interviews were expected to be the major source of information for the study.

The third section of the chapter discusses the results of the card sort procedure. The card sort results are analyzed in each of three areas of discussion: the instructors' perceptions of the ABS skills; an analysis of the "extent" of teaching of each of the skills; and an analysis of the instructors' perceptions concerning the "manner" of teaching of the skills. In each of these areas, the analysis procedure is explained and the results of analysis presented, and then the results are discussed. Since the card sort was intended to act as an adjunct to the interviews, the card sort results are discussed in terms of the interview results wherever possible.

The ABE Mathematics program at AVC Edmonton

In order to provide a background for comments made by the AVC instructors, the following is a brief description of the courses in the ABE mathematics program. Figure 2 contains a flow diagram of the courses which corresponds to the routes taken by most students. All courses are 10 weeks in duration with the exception of "AB3", the Pre-trade course.

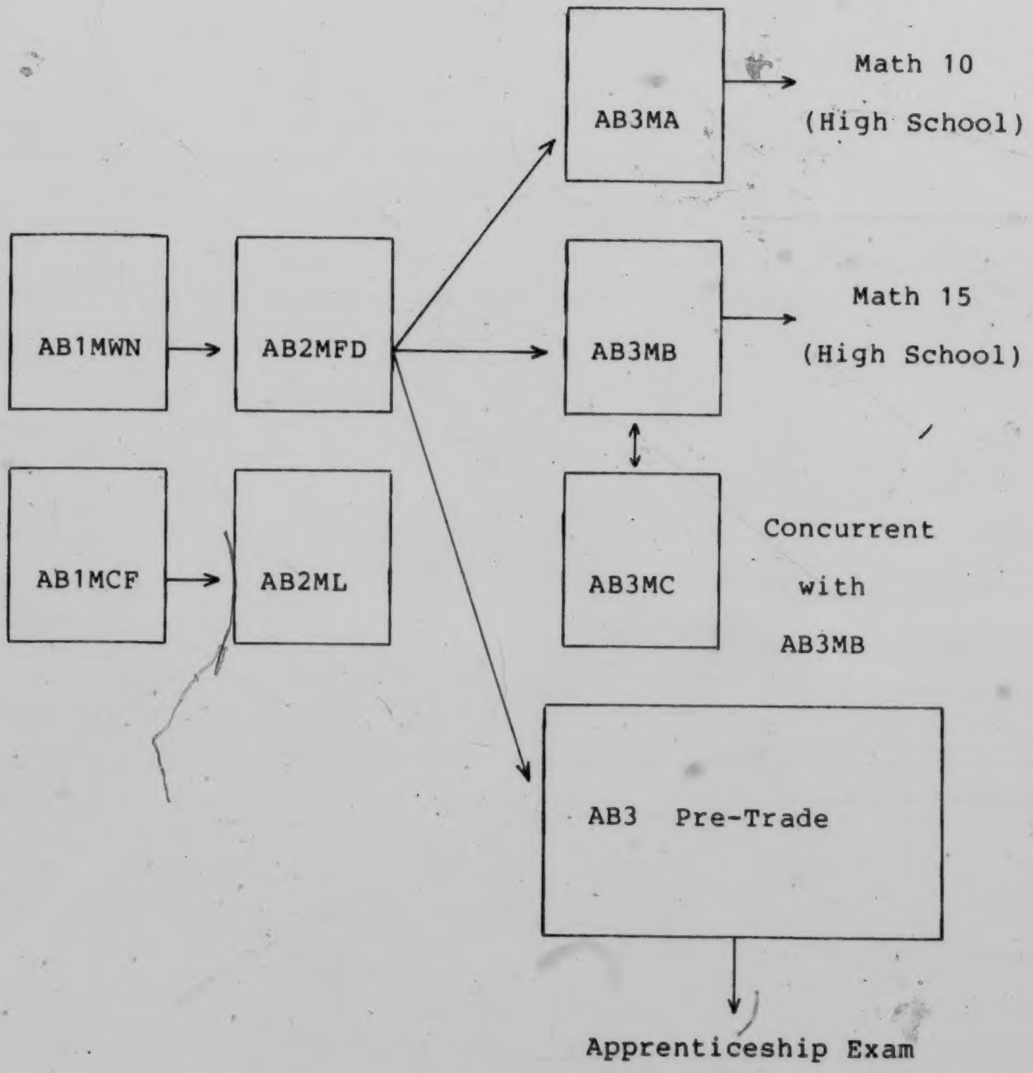
AB1MWN contains whole number operations - addition, subtraction, multiplication and division - with problem solving.

AB1MCF (Functional Calculator) teaches students to use hand calculators to perform basic mathematics operations in order to handle day-to-day mathematics activities. For learning disabled

FIGURE 2

ABE MATHEMATICS COURSE

AT AVC EDMONTON


AB3MA
Math 10
(High School)
AB1MWN
AB2MFD
AB3MB
Math 15
(High School)
AB1MCF
AB2ML
AB3MC
Concurrent
with
AB3MB
AB3 Pre-Trade
Apprenticeship Exam

	students, students whose ABE program requires very little mathematics, and students with reading skills insufficient for other courses.
AB2MFD	contains decimal and fraction operations with problem solving. Also perimeter and area.
AB2ML	(Math Lab) is a remedial course which provides some individualized instruction for students taking other ABE mathematics courses but deficient in some areas. Also used as a continuation of AB1MCF for students whose reading skills have improved, but whose mathematics skills are very low.
AB3MA	contains simple Algebra, equations in one unknown, evaluating and rearranging formulas.
AB3MB	contains percentages, metric system, graphs.
AB3MC	is for students with business related goals. They must simultaneously take AB3MB. Students are taught to use desk top calculators, first for simple mathematics operations, and then for simple business applications.
AB3	Pre-trade contains some higher level skills,

including equations in one unknown, evaluating and rearranging formulas. Also includes ratio and proportion, percentage, metric etc. Topics dictated by apprenticeship exam.

Students are initially placed into AB1 or AB2 level courses by an in-house placement test. Students whose scores place them higher than the AB2 level are placed into an AB3 level course depending on the student's goals. Students may move from AB1MCF (Functional Calculator) to AB1MWN if their general skills improve.

Interview results

Introduction

Following the card sort, each respondent participated in an open-ended, semi-structured interview. The interview questions, which were used during the interviews as starting points for discussion, are included in Appendix D. The information resulting from the interviews was categorized according to the underlying concepts inherent in the interview questions, and according to topics brought forth by the mathematics instructors during the interviews. These categories have been used in this section to present the interview information. The categories are:

1. The Adult Basic skills mathematics listing as compared to the existing ABE mathematics program.

2. Comments on the Adult Basic Skills listing.
3. Comments on the topic: should ABS be used?
4. Suggestions for methods of incorporating ABS:
   - ABE program goals and structure
   - Methods of incorporation
   - Instructional activities
   - Resources and facilities
   - Suggestions for activity

All words or phrases placed in quotations have been taken verbatim from the comments of the instructors.

The Adult Basic Skills Mathematics Listing as Compared to the Existing ABE Mathematics Program.

Most of the Mathematics instructors stated that there was a difference between the ABS mathematics skills and the skills that they are teaching in their classes; however the difference was generally stated to be one of emphasis in instruction rather than overall direction. Most instructors stated that the existing mathematics program covers "many" or "most" of the ABS mathematics skills. (One instructor said that seven out of ten of the ABS skills are included in the existing program.) All of the instructors stated, in various ways, that the Adult Basic Skills listing represented the general direction in which they were trying to move their courses through the ongoing process of curriculum renewal. However, as one instructor said, "these types of skills are not presently approached in as much detail as in the ABS, and evaluation of students is now based solely on mathematics, not on the 'functional' type of adult skill." Some of the ABS skills are presently included in the curriculum, but are not really "taught"; rather they are merely "presented to give exposure to the student." One instructor felt that there could not be a difference between the ABS mathematics skills and the AVC mathematics curriculum since "we are trying to be as down to earth as possible, and since those who put [the ABS listing] together felt the same, the ultimate result should be the same."

Some specific skills were noted as not presently being included in the AVC mathematics program; skills having to do with budgeting money for leisure time or budgeting money for moving expenses; and those involved with some banking services, especially chequing accounts which, it was stated, very few students have. One instructor felt that some of the skills, although not taught in the Mathematics program, may be covered to some extent by the present English program at AVC.

One skill area contained in the Mathematics program, but which was identified as not being included in the ABS listing was that of computer literacy. A further difference identified between the ABS listing and the AVC Mathematics program is that the current curriculum contains academic skills such as Algebra, which would include skills not mentioned by the ABS listing. One instructor explained that the existing mathematics courses are presently oriented toward "traditional" mathematics skills. A major reason for this, it was stated, is that a successful student in the ABE program should be able to enter high school credit courses (such as Mathematics 010) and some students may ultimately attend business or technical colleges. Thus the entry requirements for these higher levels place demands on the ABE mathematics curriculum. The ABE courses usually introduce the necessary mathematics concepts, which are then persued in more detail in the high school program at AVC or elsewhere. Another instructor stated, "if the student's next course does not include 'life skills' requirements, such skills are left out of the mathematics course, but not because of the perspective on the practical needs of the student."

Another reason given for some of the differences between ABE Mathematics and ABS is that "although we do try to go in these [ABS] sorts of directions, instructors may not be aware of some of the subcomponents because they are mathematics subject specialists."

There was some concern expressed on the part of the instructors that although some of the ABS skills are in fact taught in some portion of the ABE program, students may or may not have the opportunity to be exposed to the skills.

Some students may never get past the lowest level courses due to their inherent mathematics or reading abilities, and will thus miss skills presented in higher level courses. Conversely, those who are streamed toward the more academic courses will have less opportunity to be exposed to the "functional" types of skills. Some of these latter students may however be exposed to the skills "on the rebound" if they fail the academic courses.

Comments on the Adult Basic Skills listing

The second interview question asked the mathematics instructors to comment on the adequacy of the ABS mathematics skills considering that the objective of the ABS listing was to define the skills required for an adult to function in Alberta society. In general, the instructors stated that the mathematics requirements are adequately represented, however some indicated that the listing "goes too far" and presents skills which are unnecessarily "advanced". In other words, the instructors tended to relate their comments to the needs and abilities of their students, and in so doing some said that the skills go beyond what is needed at the basic level. They stated that some of the skills were "irrelevant" for their students. Specifically mentioned were: the skill concerned with income averaging ("Calculate income averaging where appropriate"); those skills concerned with determining skills for the future (e.g. "Plan for future increased use of electroskills are stated in a general manner. Within an ABS skill statement, it was said, some of the "lower end" skills might presently be covered in ABE Mathematics, but the "higher end" skills might not be covered. A specific example given was the skill "Comprehend relationship of time/distance", which the instructor said could be interpreted to varying degrees of complexity. One skill which most instructors had difficulty in understanding and interpreting was "Understand currency systems". They felt the statement should be eliminated or refined.

Comments on the Topic: Should ABS be Used?

As mentioned previously, the Mathematics instructors were in general agreement that the ABS listing represents the overall direction in which they are already trying to change their courses. In keeping with this, the instructors are in favour of using ABS in some way as a basis for curriculum development. The extent to which the ABS listing should be used was more precisely the topic of discussion. Overall, the instructors indicated that they would readily accept the ABS listing, not as a mandatory set of curriculum requirements, but as an overall guide to some skills which it would be desirable to include in the program.

The reasons given for the instructors' opinions in this regard were mostly phrased in terms of the instructors' perceptions of their students' needs. Reflecting a comment mechanical calculators"); and skills having to do with employment, since "many of our people are unemployed". One instructor stated that, "if we were talking about English skills instead of mathematics, the equivalent would be for everyone to do a Masters degree in English.

Some instructors stated that some of the skills might simply be too complex for the students. It was stated that in some ABE students, the reading level is low and/or the mathematics ability is low. This would disallow such students from analyzing and working with the more complex problems covered by some skills. "Some students would never get to some skills, for example those involving estimating future costs."

A few of the instructors commented on the variation in "specificity" of the Adult Basic Skills. In other words, some skills are stated in very general terms, where as others are stated at a detailed level. One person noted that the skill concerning arithmetic operations ("Apply basic arithmetic operations to solve problems") "is the whole ball game here; that one card is 70% of our time." Another instructor noted that "ABS needs more breakdown, especially at the whole numbers level.".

Some instructors expressed the need for standards of acceptability for the skills, especially since some of the that was made by 3 people, one instructor stated, "it would be dangerous to assume that all students require this kind of instruction...not all students have problems; some simply need academic upgrading and are already handling their lives quite well." Instructors generally stated that an increase in "functional" or "life" skills would be a good idea and would more fulfil student needs, however a distinction was drawn by some instructors between student "needs" and student "desires". One instructor felt that ABE students are generally goal oriented, with traditional social goalsthat are related to, and can be achieved by, academic studies. This instructor felt that "too much" life skills instruction would be perceived as being less relevant by students and would thus result in a negative response, as had been the case during previous life skills course offerings in the ABE department. On the other hand, two instructors noted a very positive student response to previous "consumer" courses as evidence that an increase in "life" skill type offerings would be warmly received by the students. All agreed that there would be some skills that students would not want or agree with.

The question of whether ABS should be used was not merely hypothetical for some instructors since they had already taken steps to include in their courses skills identified during the early phases of the ABS project. Two said that their involvement in aspects of the ABS development project had "rubbed off" on them and that the results of the project had had a direct, if not consciously applied, effect on their normal curriculum revision work. Another said that a conscious attempt had been made to include competencies from the initial Competency Analysis Profile, with beneficial results noted in the classroom.

Suggestions for Methods of Incorporating ABS

The instructors offered many suggestions concerning possible methods to incorporate the ABS mathematics skills in their program, and made comments on the results that would ensue. The following sections discuss these suggestions.

ABE program goals and structure.

Some instructors felt that although they were already trying, increasingly, to incorporate ABS-type skills into their courses, that an outright adoption of ABS as a basis for all Adult Basic Education department curriculae would require a significant shift in the overall goals and objectives of the ABE department. A shift would be required away from the academic upgrading orientation. With the exception of one instructor, the instructors did not indicate that a shift towards ABS would necessarily be bad, however they did state that academic upgrading would still be a very necessary and pragmatic requirement for many students. From this perspective, it was suggested that perhaps ABS should be emphasized for students who do not meet their academic goals.

In spite of the above concerns, four instructors mentioned that even a partial incorporation of the ABS skills would best be served by an increase in the coordination between the ABE Mathematics program and the ABE Reading and Science programs. They stated that such a change would be desirable in any case, but that ABS would increase the importance of increased coordination. Some of the ABE mathematics skills might best be taught in the context of Reading or Science, and Mathematics skills should ideally be taught in mathematics courses using skills that are of concern in the Reading program.

Methods of Incorporation. In order to avoid a wholesale change in the purpose of ABE, the ABS mathematics skills could be used in different ways. The instructors identified three major options:

1) The skills could be used as a resource bank such that instructors would incorporate whatever skills they could whenever they felt it best.
2) The skills could be used to create "enrichment" modules which could be used for individual students as the need arose.
3) The skills could be evolved into an ABS-based course which could be attended by selected students as the need arose.

The instructors identified strengths and weaknesses associated with the above options. The one difficulty that all three options attempt to resolve is that, as all the instructors agreed, not all students need to receive instruction in the same skills. It was suggested that some type of screening process be employed, either using the AVC counselling services, or some type of technique to be used in the classroom. The options would also allow instructors to retain the existing results of their ongoing attempts to revise the course curriculae. They all felt that some type of work would still have to be done to the ABS skills no matter which option was chosen. As one instructor stated, "the present document [ABS catalogue] is so weighty that it is unlikely to be used."

The instructors generally shared the premise that many ABS skills would have to be additions to the present program rather than replacements for presently taught skills. Thus an important topic for consideration in all three options listed above is the student's time availability. If students were required to take an extra course, it would require either that the 10 week term be lengthened or that the students' schoolday be lengthened. The instructors seemed to feel that a longer term would pose problems for the students who, as a group, are usually trying to minimize the amount of time spent in the institution. Lengthening the school day would cause problems for the many students that hold part time jobs.

Time considerations thus would seem to make it difficult to incorporate options 1 or 2 in the higher level courses due to the academic commitments necessary in those courses. One instructor noted that there is already a problem with desirable mathematics skills (Geometry was given as an example) being left out of the program due to time constraints. However the only instructor who had actually attempted to incorporate ABS-type skills into her courses (option 1) indicated that a careful inspection of the Business Mathematics courses had revealed areas where the ABS skills could replace existing course material. Based on that experience, the instructor suggested an approach which would be a combination of options 1 and 2. ABS mathematics skills could be incorporated into the Business Mathematics courses, and the lower level functional Calculator course, leaving only the students taking academic courses. Those students would need to take some extra course work to obtain the extra ABS mathematics skills. However, as was noted earlier, some instructors feel that the students with the highest academic capabilities are least likely to require additional instruction in "functional" or "life" skills courses. This would suggest some amount of screening of the students if this method of incorporation was to be used.

The use of the Functional Calculator course for ABS mathematics skills was suggested by three instructors. This course is normally reserved for students who have shown that they do not have the capabilities to handle the higher level Adult Basic Education mathematics skills. The purpose of the course is to provide the students with some minimal mathematics skills by using hand calculators. It seemed to these three instructors that the course would be a good place to increase the amount of "functional" skills. It should be noted, however, that some instructors felt that the students who are lower in inherent abilities, and who would be the students most likely to be participating in the functional calculator course, might not be able to achieve some of the ABS skills.

The instructors also stated a preference to retain some flexibility, in order to meet student needs, if any class became predominantly ABS based. As one instructor stated, "what scares me most is that we would end up with a new, inflexible curriculum as the academics [subjects] are now." Another stated that any system resulting from the incorporation of the Adult Basic Skills should be flexible enough to allow students to move from academic to non-academic skills as needed.

Instructional Activities. Although one instructor stated that if the ABS mathematics skills were included in the AVC curriculum that no changes would be required in classroominstructional activities, others indicated that classroom procedures should change. It was stated that the present mathematics curriculum allows a direct dissemination of information as in lecture style classroom presentations. The incorporation of ABS would result in more "experiential" classes involving more of a "self-discovery" educational procedure and more "one-on-one" procedures. Courses would have to be constructed so that information was presented in "simple, small steps". One instructor stated a preference for "hands-on" class procedures for many ABS mathematics skills, stating that students relate to interactive classroom experiences more easily and quickly, making the experience more relevant and reasonable for the student.

Resources and Facilities. Instructors were divided on their opinion concerning a possible need for more, or different types of resources and facilities as a result of incorporating the ABS mathematics skills. Two instructors stated a need for a different or specialized type of classroom space since blackboard work would not be sufficient. One saw a need to reallocate existing space. Two instructors indicated a need for specialized course materials and instructional aids. One instructor said that an increase in staffing might be necessary. Three stated that no staffing or facility changes would be necessary. All instructors who commented on the topic felt that the expertise needed to teach the additional skills already exists within the ABE staff.

Suggestions for Activity. The mathematics instructors had some suggestions for some preliminary action to take with respect to the ABS listing. It was suggested that the ABE mathematics instructors could sit down and look over the skills to see which could be taught and at what level of the ABE program they could be included. It was also suggested that a decision should be made concerning whether the skills should be included at the instructor's option, or whether they should be included as mandatory items in course curriculae.

One instructor noted the varying levels of difficulty (from a student's point of view) of the ABS mathematics skills and suggested that the skills should be categorized into different levels of difficulty. This, it was stated, would more easily allow incorporation of the skills into the ABE program. A suggestion by another instructor in this context, to help categorization, was that the "pure" mathematics aspect of the skills should be used as the organizer. Thus the ABS mathematics skills could be categorized into levels of difficulty based upon the pure mathematics needs of the skill.

Results of the Card Sort

During the card sort, individual respondents applied a branching series of questions to each skill such that each skill could ultimately have been placed in any one of eleven different categories. Appendix C contains the card sort instruction sheets and thus the full text of the questions asked. An indication of the choice route for each skill with the resulting categories and category labels was depicted in Figure 1 in the previous chapter. The results of the card sorts performed by the seven instructors may be found in Appendix E. In the following analysis of the card sort results, the discussion is grouped into three areas:

1. Analysis of the instructors' perceptions of the skills (Part I of the card sort)
2. Analysis of the extent to which each skill is taught (Parts II, III, IV of the card sort)
3. Analysis of the instructors' perceptions concerning the "manner" of teaching of skills containing non-mathematical components (Part III of the card sort)

Each of these three areas contains two sections. The first section presents the method of analysis and the results of the analysis. The second discusses those results and relates them to the interview comments of the instructors wherever feasible.

Analysis of Instructor's Perceptions of Skills (Part I of Card Sort)

Analysis and Results. Part I of the card sort asked the respondents to sort the cards into two piles: "A" and "B".

Pile A would consist of skills which the respondents felt contained only a mathematics component. Pile B would consist of skills which contained both a Mathematics and a non-mathematics component.

In order to inspect the degree of consensus among the instructors in Part I of the card sort, the numbers of "A" and "B" responses were tabulated for each skill. The results of this tabulation are shown in Table 1. An inspection of the tabulation showed that:

- There was unanimous agreement for 22 skills (32% of the total)
- There was "substantial" agreement (6 out of 7 instructors were in agreement) for a further 21 skills (31% of the total)
- There was "some" agreement (5 out of 7 instructors were in agreement) for a further 13 skills (19% of the total)
- There was "little" agreement (4 out of seven instructors were in agreement) for a further 12 skills (18% of the total)

A majority opinion was calculated for each skill. The resulting opinions for each skill are listed in Table 1. There were 24 skills considered to contain only a mathematics component ("A") and 44 considered to contain also a non-mathematics component ("B").

Table 1

Responses to Part I of Card Sort

Skill No.	Responses A	B	Majority Opinion	Skill No.	Responses A	B	Majority Opinion
1	7	0	A	35	3	4	(B)
2	7	0	A	36	2	5	B
3	7	0	A	37	2	5	B
4	5	2	A	38	4	3	(A)
5	5	2	A	39	1	6	B
6	7	0	A	40	1	6	B
7	7	0	A	41	1	6	B
8	2	5	B	42	0	7	B
9	6	1	A	43	3	4	(B)
10	5	2	A	44	1	6	B
11	4	3	(A)	45	1	6	B
12	6	1	A	46	1	6	B
13	4	3	(A)	47	1	6	B
14	6	1	A	48	1	6	B
15	7	0	A	49	0	7	B
16	5	2	A	50	0	7	B
17	6	1	A	51	0	7	B
18	4	3	(A)	52	0	7	B
19	6	1	A	53	1	6	B
20	1	6	B	54	0	7	B
21	1	6	B	55	3	4	(B)
22	0	7	B	56	5	2	A
23	3	4	(B)	57	4	3	(A)
24	3	4	(B)	58	4	3	(A)
25	0	7	B	59	4	3	(A)
26	2	5	B	60	4	3	(A)
27	1	6	B	61	1	6	B
28	1	6	B	62	0	7	B
29	2	5	B	63	0	7	B
30	1	6	B	64	0	7	B
31	1	6	B	65	0	7	B
32	2	5	B	66	0	7	B
33	1	6	B	67	0	7	B
34	0	7	B	68	0	7	B

Key: "A" indicates that skill was perceived to contain only mathematics

"B" indicates that skill was perceived to contain both a mathematics and a non-mathematics component

( ) Results in brackets indicate marginal majorities

During this part of the card sort, two instructors indicated some difficulty with the use of the term "mathematics" in the card sort instructions. They expressed varying personal definitions of the term. Two respondents also noted that the phrasing of the skill, in particular the verb used (whether it was an "action" verb or not), contributed to their understanding of how to sort the skills in this part of the card sort.

Discussion. There seems to have been some consensus among the instructors concerning the response to the question in Part I of the card sort. Although there was unanimous agreement on only 22 of the skills, there was "little" agreement on only 12 skills, with the remainder achieving a fair degree of consistency. Due to the small number of respondents, some degree of consensus in this part of the card sort was essential to make the results of Parts III and IV meaningful. The comments made by some of the instructors concerning the use of the term "mathematics", and their apparent use of the phrasing of the skills, rather than the contents, to make their decisions for the sort, indicate that the results here should be treated with some caution since the instructors seem to have handled the sort in varying, though perhaps subtly varying, ways.

Concerning the actual responses to this part of the sort, one might have expected to see the skills in the ABS

"Mathematics" category (skills 1 to 20 inclusive) receive sortings into Category "A" (Skills containing only mathematics), and skills from the remainder of the listing receive sortings into Category "B" (Skills containing both a mathematics and a non-mathematics aspect). In general, this occurred, but the exceptions are notable. Skill 8 ("Understand Currency Systems") and skill 20 ("Plan for future increased use of electromechanical calculators") were the only skills from the first twenty that received "B" ratings by the majority of instructors. The meaning of skill 8 seemed to confuse the instructors consistently, and skill 20 was one of those said to be "irrelevant" by some.

On the other hand, skill 38 ("Reconcile bank statements") was perceived as being wholly mathematical by the instructors, as were skills 56 through 60, all of which are concerned with reading and understanding graphs. Although these skills (56 to 60) are phrased in terms of reading skills, and are extracted from the section of the ABS listing concerned with reading, the opinion of the ABE mathematics instructors seems to be that they are predominantly mathematics oriented, not reading oriented.

It could thus be concluded that the responses to Part I of the card sort represent a limited validation of the organization of the mathematical aspects of the ABS listing with some indications for change.

Analysis of the Extent to Which Each Skill is Taught (Parts II, III and IV of the Card Sort)

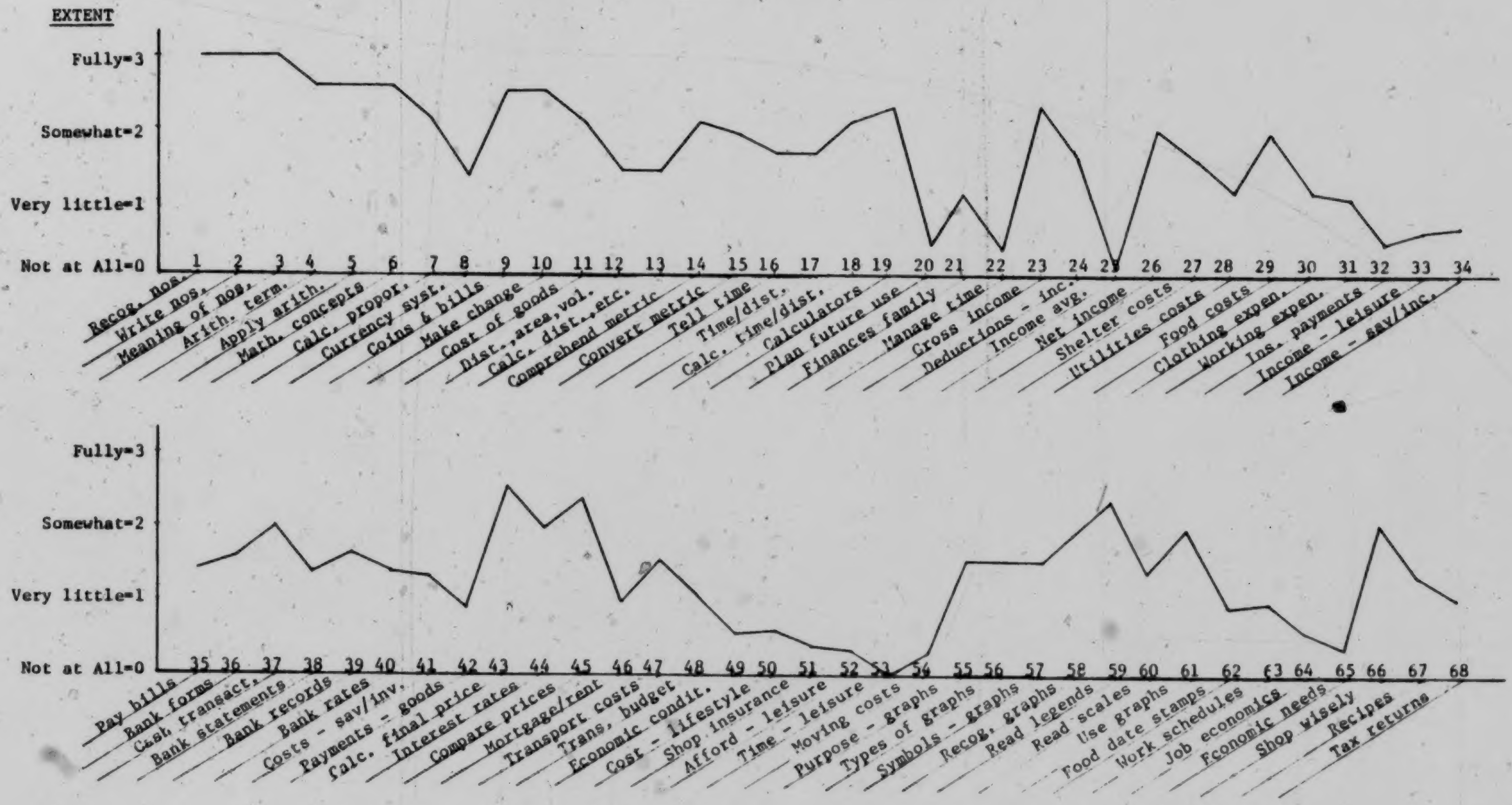
Analysis and Results. Parts II, III and IV of the card sort asked the mathematics instructors to indicate the extent to which they teach each skill. In order to inspect the "extent" rating, an assignment of values was made. Each rating of "Fully" was assigned a "3", each rating of "Somewhat" was assigned a "2", each rating of "Very Little" was assigned a "1", and each rating of "Not at All" was assigned a zero. The mean response for each skill was then calculated.

It may be noted that the assignment of values was made without reference to whether the respondent had placed the skill in Category "A" (Skill contains only mathematics), Category "B1" (Both mathematics and non-mathematics aspects of the skill are taught), or Category "B2" (The skill, in which both mathematics and non-mathematics aspects exist, is used as a general setting in emphasizing only the mathematics aspect). The possible effects of these category choices on the results presented here are discussed later in this chapter.

The results of the "extent" calculation are presented in graphical form in Figure 3. (Figure 3 contains shortened forms of the skill statements; the full text of the skill statements may be found in Appendix A.) The calculations

FIGURE 3

MEAN RATINGS: EXTENT TO WHICH EACH SKILL IS TAUGHT



resulted in the distributions for various ranges of mean value as shown in Table 2.

Table 2

Distribution of Skills for Various Ranges of Mean Value of "Extent" of Teaching

Mean Value Range	No. of Skills	Percentage of all Skills
2.5 to 3.0	9	13%
1.5 to 2.5	26	38%
0.5 to 1.5	24	35%
0 to 0.5	9	13%

Although the above calculation may provide an indication as to the overall responses of the instructors to the question of the extent of teaching of the skills, it does not give a clear picture of which skills were not taught at all.

If even one instructor indicated that he or she taught a skill in his or her classroom, it might be concluded that the skill is included in the AVC Mathematics instruction. In fact only one skill received a unanimous response of "Not at All". Thus except for that one skill, all the skills could be considered as being included in the ABE curriculum. However, this conclusion would be misleading since each instructor does not teach all of the courses in each semester. Thus a skill rated as being taught by a single instructor would be taught in the curriculum only when that instructor had the opportunity to teach the course in which he or she includes that skill. The instructor would not necessarily have the opportunity in each semester. (This concern about interpretation was, in fact, raised by one of the instructors during the interviews.)

From this perspective the number of "Not at All" responses for each skill should be considered as indicating the relative likelihood that the skill would be included in the curriculum in any given semester. Naturally, the fewer "Not at All" responses received by a skill, the more likely that it would be taught. As a result of these considerations, the number of "Not at All" responses received by each skill was calculated. The number of skills receiving different numbers of "Not at All" responses are shown in Table 3.

Table 3

Number of Skills Rated "Not at All"
by Different Numbers of Instructors

Number of Instructors Rating a Skill "Not at All"	Number of Skills So Rated
7	1
6	5
5	7
4	3
3	9
2	7
1	14

Thus a total of 46 skills were rated as taught "Not at All" by at least one instructor. The specific skills found to fall in each of the above seven categories are listed in Appendix F. An inspection of the skills listed in Appendix F did not reveal any general types of skills that were less likely to be taught than others. The skills in Appendix F seemed to be individual selections from all parts of the ABS listing.

During the interviews, some instructors indicated that many of the ABS mathematics skills already exist in the Mathematics curriculum at AVC Edmonton. The card sort responses were used to investigate this possibility. A tally was made of the data by grouping together the "Fully" and "Somewhat" responses into one category. This grouping creates a new composite category which may indicate teaching of a skill to some significant or material degree. The resulting information is shown in Table 4. An inspection of this information showed that 49 skills had been rated as being taught "Fully" or "Somewhat" by at least 4 (i.e. a majority) instructors. Thus 49 out of 68 skills (72%) were considered as being already included in the curriculum by a majority of the instructors.

Discussion. Some overall comments can be made with respect to the above findings. The mean values for "extent" of teaching of the skills tend to indicate that, in general,

Table 4

Extent of Teaching Responses

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Combined Categories

Skill No.	Fully/ Somewhat	Very Little/ Not at All	Skill No.	Fully/ Somewhat	Very Little/ Not at All
1	7	0	35	3	4
2	7	0	36	5	2
3	7	0	37	5	2
4	7	0	38	4	3
5	7	0	39	4	3
6	7	0	40	4	3
7	6	1	41	4	3
8	3	4	42	2	5
9	7	0	43	7	0
10	7	0	44	6	1
11	5	2	45	7	0
12	4	3	46	3	4
13	4	3	47	5	2
14	6	1	48	2	5
15	5	2	49	2	5
16	3	4	50	2	5
17	4	3	51	1	6
18	7	0	52	1	6
19	7	0	53	0	7
20	1	6	54	1	6
21	3	4	55	5	2
22	1	6	56	5	2
23	6	1	57	5	2
24	4	3	58	6	1
25	0	7	59	7	0
26	5	2	60	5	2
27	3	4	61	6	1
28	3	4	62	2	5
29	6	1	63	3	4
30	3	4	64	2	5
31	3	4	65	1	6
32	1	6	66	6	1
33	2	5	67	3	4
34	2	5	68	3	4

the skills are taught only to a modest degree. However, the results of the tabulation of the "Not at All" responses, and the fact that 72% of the skills were considered as being included in the curriculum by a majority of the teachers indicate that a substantial number of the skills are taught in the curriculum. These somewhat contradictory findings may show that although the ABS mathematics skills tend to be included in the curriculum, they tend to be taught only to a minimal degree. This conclusion is supported by comments made during the interviews, wherein instructors stated that the ABS skills were taught, but that the difference (between ABS and ABE) was a matter of "emphasis" in the curriculum.

An inspection of the graph in Figure 3 reveals some information about the individual skills. Skills numbering 1 through 20 represent the "Mathematics" category of the ABS listing. This group includes the most highly rated skills in the study. Four of these skills are worthy of note. Skill 8 ("Understand currency systems") received a relatively low rating. It was poorly understood by the instructors, and almost all of them expressed confusion over its meaning. The relatively low ratings for skills 12 and 13, which have to do with "distance, area and volume", are understandable from an inspection of the ABE course descriptions. In these descriptions, volume calculations are not mentioned at all, and area calculations are included in only one course as an "optional" topic should time allow. Skill 20 ("Plan for future increased use of electromechanical calculators") was not considered to be wholly mathematical by 6 out of 7 instructors, as would be noted from Table 1. It may also be noted that skill 20 is phrased in terms of planning for the future. The concept of planning for the future happened to have some significance.

In an attempt to find a commonality between skills rated low in terms of extent of teaching, Appendix F was examined in conjunction with the graph. The underlying concept of planning or considering the future is common to many. In fact, although identifying such skills is a very subjective exercise, all of the skills relating to estimating or planning for the future received a mean "extent" rating equivalent to "very little" or lower. It should be noted here that all of such skills, with the exception of skill 20, related to financial or time planning. This observation concerning skills involving future planning supports statements made by the instructors in their comments about the ABS listing. In discussing some skills felt to be "irrelevant", mention was made of "those skills concerned with determining skills for the future." The results of the card sort would tend to expand on this statement by including most skills having to do with any sort of planning for the future.

A further inspection of skills receiving low ratings, especially in light of instructors comments during the interviews, gives rise to individual reasons for the low rating in some cases. For instance skill 25 ("Calculate income averaging where appropriate") received special mention during the interviews as being of little use for ABE students, as did skill 53 ("Ascertain time available for leisure activities"), and other examples can be found. In general it may be concluded that the extent of teaching ratings do seem to mirror closely the results of the interviews.

Analysis of Instructor's Perceptions Concerning the 'Manner' of Teaching Skills Containing Non-Mathematics Components (Part III of Card Sort)

(Note: When reading the following discussion, it may be useful to refer to Figure 1.)

Analysis and Results. In the previous section, instructors' responses concerning the "extent" to which they teach each skill were treated without reference to whether the instructors had placed the skill in Category "A" (the skill contains only a mathematics component) or Category "B1" (the skill contains a non-mathematics component but both mathematics and non-mathematics aspects are taught) or Category "B2" (the skill contains a non-mathematics component, but the skill is used as a general setting in emphasizing only the mathematics aspect). In the design of the card sort, the distinction between Category "A" and Category "B" was included in order to investigate which skills would be perceived as belonging in Category "B2". There seemed to be a possibility that a skill taught in the manner suggested by Category "B2" would not actually be treated as thoroughly in the classroom as a skill taught in the manner suggested by Categories "A" and "B1".

A count of the number of skills placed in the "B2" Category by the various instructors yielded the information shown in Table 5. (A listing of the skills found in each of the divisions in Table 5 is included in Appendix G.)

Table 5

Number of Skills Placed in Category "B2" by Different Numbers of Instructors

Number of Instructors Placing a Shift in Category "B2"	Number of Skills So Rated
7	0
6	0
5	0
4	2
3	7
2	22
1	19

Thus there were no skills placed unanimously in Category "B2" by the instructors, and only two skills were placed in this category by a majority (4 or more) of instructors. As a result it was felt that the use of this category had little effect on the responses to the question concerning the "extent" of teaching of the skills. Consequently it was concluded that the "extent" ratings from Category "B2" could be calculated into the mean ratings with responses from other categories, as was done in the previous section.

Discussion. The above results may be interpreted to mean that individual instructors did feel that they taught some skills such that only the mathematics aspects were emphasized, with the non-mathematics aspects (perhaps the life skills aspects) being used only as general settings for instruction. An inspection of the original card sort responses (Appendix E) shows that all seven instructors rated some skills in this way (Category "B2"); in fact, the instructors placed an average of 13 skills each into Category "B2". However there was a lack of consensus as to which skills were taught in this manner. Consequently, although the considerations inherent in the inclusion of this category in the card sort seem to be valid for individual instructors, there is little information to be gleaned from this particular sort if one is concerned with making statements about the ABE curriculum as a whole.

Due to the lack of consensus there are very few skills which can be said to be affected by the consideration of the "manner" of teaching. There were however a few skills which were placed in Category "B2" with a small degree of consistency by the instructors. The "extent" of teaching ratings received by these individual skills could be considered in the light of their placement into Category "B2". In particular, Appendix G shows two skills placed in "B2" by four instructors (a majority). These were skill 27 ("Establish costs for shelter") and skill 66 ("Shop for food/groceries as a wise and informed consumer"). The latter of these is of particular interest since it received a relatively high "extent" rating (2.1 out of a possible 3) and it could thus be inferred that the instructors place some importance on the skill. Certainly, few people would deny that this is an important skill for an adult to have. The results for this skill with respect to Category "B2" may indicate that the life skills aspects of the skill are not being taught to the degree which might be desired, or the degree implied by the "extent" rating which the skill received.

CHAPTER FIVE

SUMMARY AND CONCLUSIONS

This chapter contains three sections: a summary of the study; a discussion of conclusions and implications drawn from the study; and some suggestions for further research.

Summary of the Study

Purpose of the Study

The Adult Basic Skills listing is a catalogue containing approximately 1000 skills, compiled to describe the skills than an adult needs in order to be able to function in Alberta society.

The purpose of the study was to provide an evaluation of some aspects of the relationship between the Adult Basic Skills (ABS) listing and the existing Adult Basic Education (ABE) program at the Alberta Vocational Centre in Edmonton. Specifically, the study was designed to provide an indication of the degree of change which might be required in the existing program if the mathematically oriented Adult Basic Skills were to be incorporated into the ABE program. An auxiliary purpose of the study was to offer an opportunity for ABE instructors to provide feedback, in a systematic way, to the continuing process of the development of the ABS listing.

Statement of the Problem

The study sought answers to the following questions:

1. "To what extent are each of the various mathematically oriented skills in the ABS listing being taught in the Adult Basic Education department at the AVC in Edmonton?"
2. "What would be the implications if the mathematically oriented Adult Basic Skills were to be incorporated into the Mathematics program?"
3. "What would be some possible methods to accomplish the incorporation of the skills?"
4. "What are the concerns and suggestions of the ABE mathematics instructors with respect to the ABS listing and the curriculum development process?"

Need for the Study

The literature has provided statements which indicate that curriculum evaluation should be an integral part of the curriculum development process. Since curriculum development may be a long term goal of the ABS project, this study was designed to provide feedback to the curriculum development process at an early stage in that process. It was hoped that by providing some indication of the possible implications of incorporating the ABS mathematics skills into the AVC program, future choices concerning curriculum development techniques and resource allocation would be facilitated.

A further need for the study was identified in that the ABS project directors had indicated some concern about the adequacy of the mathematics skills in the listing. It was hoped that the results of this study would address those concerns.

Review of the Literature

The literature reviewed in the study covered two different areas: first, the field of educational evaluation; second, the field of Adult Basic Education especially with respect to "functional" or "life" skills, and the mathematics curriculae used to teach those skills.

Pertaining to educational evaluation, the review showed that there are many different models and methodologies proposed for educational evaluation. The "CIPP" model of Stufflebeam and others provides a definition of evaluation as the process of providing useful information to decision makers. "Responsive" evaluation places emphasis on the "issues" of the evaluation as defined by the audience. "Naturalistic" enquiry leans away from traditional "scientific" types of investigation. It leans more towards the techniques of the natural sciences, such as field study and case study techniques in which the researcher may interact more intimately with the environment being studied. Various authors advocate choosing evaluation strategies and techniques in a flexible manner to suit the situation of the evaluation. Recent studies by the Joint Committee on Standards for Educational Evaluation have proposed standards which can be applied to any evaluation regardless of model or technique.

Pertaining to Adult Basic Education, the review indicated that although the content of ABE programs have historically been oriented towards giving students the equivalent of a grade 8 or 9 education, educators have identified adult educational needs outside of the traditional school offerings. There has been shown to be a difference between "basic" skills, such as the "three-R's", and "functional" or "life" skills such as those skills pertaining to the student as consumer, citizen and family member.

Although there are advocates of life skills instruction from both the theoretical and practical areas of education, examples of the use of life skills programs have shown that the effective delivery of life skills programs to adults presents problems based, for example, on the immediate needs of the adult, or on his home environment. In response to these difficulties, Competency Based Adult Education (CBAE) has attempted to implement individualized competency based instruction using, as foundations, systematic investigations into the skills needs of the adult learner.

The content and presentation of mathematics curriculae in Adult Basic Education life skills programs varies according to the underlying philosophy of the ABE program, whether leaning towards CBAE or towards the traditional high school curriculum. Traditionally oriented programs may include more complex mathematics skills than CBAE programs; also CBAE derived curriculae may organize learning experiences according to the life skills aspects, treating mathematics as a necessary, but not specifically emphasized aspect of those life skills.

Design of the Study

As a result of the literature review, it was decided to conduct the investigation in a "responsive" manner using a "naturalistic" approach to gathering information. Discussions were held to identify issues of concern to the ABS project directors and the ABE mathematics program director. Based on these discussions, three sources of information were used in the study:

1. An examination of course records and texts
2. A card sort performed by the ABE mathematics instructors to determine the extent to which each ABS mathematics skill was being taught.

3. Semi-structured interviews with the ABE mathematics instructors.

Of the three sources, the third was expected to be the major source for the study, while the first was used primarily to provide information to prepare the instruments used in the card sort and interviews.

Procedure of the Study

Since the Adult Basic Skills listing contains both "basic" mathematics skills (i.e. those found in a traditional school curriculum) and "functional" mathematics skills (i.e. those "life" skills which require mathematics abilities) it was necessary for the researcher to review the entire ABS listing and select all the skills involving mathematics. A list of 68 skills resulted, and is presented in Appendix A.

The 68 ABS mathematics skills became the basis for the card sort procedure which was performed by the ABE mathematics instructors. Each card contained one skill, and the cards were sorted according to various questions posed by a set of written instructions. The choice routes for the cards and the questions asked were presented in Figure 1; the full written instructions are presented in Appendix C. The card sort was designed to find the "extent" to which each of the skills was being taught in the existing ABE mathematics curriculum. It was also designed to investigate the "manner" of teaching for skills which instructors perceived to contain both a mathematics and a non-mathematics aspect. The purpose of this latter investigation was based on the speculation that the manner of teaching of the skills might affect the "extent" to which one could say they were being taught.

The card sort was also designed to prepare the instructors for the interviews. A series of interview questions was designed to provide starting points for in-depth discussion on the following topics:

1. The instructor's perceptions of the difference between the Adult Basic Skills mathematics skills and the ABE mathematics curriculum as it was being taught.
2. The adequacy of the ABS mathematics skills for Albertan adults.
3. Required changes at AVC Edmonton if the ABS mathematics skills were to be incorporated. Areas specifically questioned included resources, program structure, facilities, time, and instruction activities.
4. The instructor's feelings as to whether the ABS listing should be used as the basis for curriculum change.

5. The instructor's overall suggestions for the curriculum change process.

Individual appointments were made with each mathematics instructor. During the meetings the instructor performed the card sort and then participated in the interview. The researcher was present for the entire meeting and encouraged discussion and comments on the part of the instructor during the card sort so that the card sort became a precursor to the interview.

Data from the card sorts was analyzed by hand. Various skill groupings, anticipated to be of interest to a curriculum designer, were developed. Groupings included skills rated as being taught to a greater or lesser extent, skills perceived as containing a non-mathematical component, and skills where the non-mathematical component was not emphasized during teaching.

Analysis of the interview results was performed by inspecting the results for topics which had proven to be of concern and interest to the instructors, and then grouping the responses according to these topics.

Summary of Results

Interview Results. Although the instructors were able to identify some specific Adult Basic Skills not taught in the existing curriculum, they stated that the ABS skills were, in general, already in the curriculum. The difference between the ABS listing and the ABE curriculum was said to be a difference of "emphasis". In other words, in the ABE curriculum, ABS skills may be taught, but not in as much detail as implied by the ABS listing. Instructors said that ABS represents the "direction" in which they were already trying to "move" their courses.

The instructors also noted that the ABE program is structured so that a successful student may go on to high school or apprenticeship training. This fact places some demands on the course contents and is the major reason for the inclusing of some higher level mathematics skills not included in ABS.

The ABS listing was designed to define the skills required for an adult to function in Alberta society. The instructors commented on this in light of the needs and abilities of their students. They felt that the listing was generally adequate for its purpose, but that it contained some skills which were "too advanced" for their students, and some that were "irrelevant". Some said that certain skills might simply be too complex for the students to attain, especially for those students with inherently low reading or mathematics abilities.

Instructors noted that there is a wide variation in the "specificity" of the Adult Basic Skills, whereby some skills cover large portions of the mathematics curriculum, and others cover narrow details. They also saw a need for "standards" (of performance) for the skills since some skill statements could cover a broad range of mathematical attainment on the part of the students.

Nevertheless, the ABE instructors were in favour of using the ABS listing as a basis for curriculum development or change. They indicated a preference for using ABS as an overall guide to some desirable skills, rather than as a mandatory set of curriculum requirements. A wholesale incorporation of the ABS mathematics skills was not preferred for a number of reasons (discussed here, and also later in this section). Some instructors felt that student needs vary with respect to "life" skills instruction, and that some students, while needing academic upgrading, simply do not need life skills instruction. Further, some instructors feared a negative student reaction to "too much" life skills instruction as not matching the students' own perceived goals. Other instructors anticipated a positive student response based on previous experience with "consumer" courses.

Two instructors indicated previous good experience with incorporating Adult Basic Skills (drawn from an earlier phase of the ABS project) in their classrooms.

Based on the previous comments, the instructors entered into much discussion related to the implications of incorporating the ABS mathematics skills into the ABE curriculum, and possible methods to do so.

The instructors noted the pragmatic requirements for academic upgrading amongst their students, and stated that an incorporation of the entire ABS listing would require a shift in departmental goals and objectives away from academic upgrading. From this perspective, it was suggested that perhaps ABS should be emphasized for students who cannot or do not meet their academic goals. It was also noted that a major incorporation of the Adult Basic Skills would lead to an increased, and needed, coordination between ABE Mathematics and ABE Reading courses.

Instructors suggested three possible methods of incorporating the ABS mathematics skills without causing a major change in the purpose of the ABE program. These were:

1. As a resource bank such that instructors would incorporate whatever skills they could whenever they felt it best.
2. The skills could be used to create "enrichment" modules which could be used for individual students as the need arose.
3. The skills could be evolved into an ABS-based course which could be attended by selected students as the need arose.

The major consideration inherent in the options was flexibility, since it was felt that not all students would need instruction in the same skills. Further, instructors generally saw little opportunity to eliminate existing course offerings, and thus flexibility would be very important in order to make the best use of students' available time. Difficulties for ABE students would arise if either the term length or the class day was extended in order to accomodate additional instruction. Some instructors said that since the lower ability students might be those most in need of life skills instruction, the low level "Functional Calculator" course might be a good opportunity to allow the needed instruction. However, it was also noted that some of the more complex ABS skills might not be attainable by students likely to be enrolled in the Functional Calculator course. One instructor also described previous success in integrating ABS-type skills into the business mathematics courses.

Instructors were of differing opinions concerning instructional activities required by the ABS mathematics skills. Some felt that no changes to existing methods would be needed, while others stated a need for more "experiential" and "self-discovery" types of instruction whereby skills are presented in simple, small steps.

Instructors were also divided on the topic of resources and facilities required by the ABS mathematics skills. Some instructors saw a need for specialized course materials or classroom space. Some felt that an increase in staffing would be needed, but others did not. All instructors agreed however, that the expertise to teach the additional skills already exists within the ABE staff.

The ABE instructors made suggestions for preliminary action to take with respect to the ABS listing. Suggestions included a need for a basic decision as to whether the ABS mathematics skills should be mandatory items in the curriculae, or whether they should be included at the discretion of individual instructors. A suggestion was also made to inspect the skills to see which could be taught in the Adult Basic Education program, and then to assign the skills to the different levels of the ABE mathematics program, perhaps basing the decision on the level of difficulty of each skill.

Card Sort Results. In the first part of the card sort, instructors sorted the skills according to whether they felt that the skill contained only mathematics, or whether the skill also contained a non-mathematics aspect. Analysis of this part of the card sort indicated that the instructors seemed to be in general agreement in their responses. There was however some indication of varying interpretation of the term "mathematics" which might lend an element of caution to interpretation of the results.

The ABS listing contains a "Mathematics" category which comprised 20 of the 68 skills in the study. The instructors seemed to be in overall accord with the ABS categorization, but with a few exceptions. In particular, they rated the skills involving graphs as being wholly mathematical, although ABS does not include them in the "Mathematics" category. There were also 2 of the 20 skills felt to contain a non-mathematics aspect by a majority of instructors.

The analysis of the ratings of the "extent" of teaching of the ABS skills in the existing Adult Basic Education curriculum tended to show, in agreement with some of the interview comments, that although the ABS mathematics skills tend to be included in the curriculum, they tend to be taught only to a minimal degree. An attempt was made to identify groups of skills rated lower or higher than average. It was noted that the skills in the ABS "Mathematics" section were, on average, the most highly rated group. There also was some indication that skills involving estimating or planning for the future tended to receive low ratings in the extent of teaching. This latter observation was also supported, to a limited degree, by interview statements. Reasons for low ratings of some of the individual skills were also identified.

The third part of the card sort was concerned with the "manner" in which instructors taught skills which they had perceived as containing both a mathematics and a non-mathematics aspect. Aside from being asked whether they did not teach the skill at all, instructors were asked whether they taught both aspects of the skill or whether the skill was used as a general setting in emphasizing only the mathematics aspect. Analysis of the results showed that although instructors did feel that they taught some skills such that only the mathematics aspects were emphasized, there seemed to be little consensus among the instructors concerning which skills they taught in this way. The original purpose of this question was to see if the "extent" of teaching responses could be affected by this discrimination in the manner of teaching; and due to the lack of consensus it was concluded that the "extent" ratings could generally be interpreted without consideration of the "manner" of instruction as described in this part of the card sort.

Conclusions and Implications

There are several conclusions and implications which may be drawn from the foregoing results. The following section is grouped according to the research questions as posed in the section "Statement of the Problem" earlier in this chapter.

Research Question 1.

The mathematically oriented skills in the Adult Basic Skills (ABS), listing are present in the Adult Basic Education (ABE), curriculum to a notable degree. Results from both the card sort, procedure and the interviews indicate that approximately 70% of the skills can be considered as being taught in the existing curriculum.

Research Question 2.

The implications arising from any possible incorporation of the ABS mathematics skills into the ABE program would depend upon the degree to which this incorporation was to take place. Given the present structure of the Alberta Vocational Centre, and thus the ABE program, there are numerous reasons for restricting a wholesale incorporation of ABS. In other words, it would be difficult to create a curriculum based solely on the Adult Basic Skills. However, The instructors have indicated that some of the ABS skills should not be included in the ABE program. This view, coupled with the conclusions under Research Question 1 (above) make it feasible to incorporate the mathematics skills without altering the present program structure and philosophies.

The instructors' statements concerning future needs for resources and facilities in the event of incorporation were so varied that no conclusions could be drawn. Concerning instructional activities, it is concluded that although current instructional techniques would be effective, some of the ABS mathematics skills might best be taught using rather specialized techniques or surroundings.

Research Question 3.

Any method chosen for incorporating the Adult Basic Skills must include a method of individualizing instruction for the student, as evidenced by instructors' comments on screening the students, and the variation in student needs, desires, abilities and time availability. Flexibility is thus also an important consideration in curriculum development involving the Adult Basic Skills.

Three possible methods for incorporating the ABS mathematics skills have been suggested:

1. Create a resource bank based on the Adult Basic Skills, for use as needed by instructors.
2. Develop enrichment modules based on the Adult Basic Skills. Use the modules as learning activities for selected students.
3. Create an ABS-based course.

These options are listed in order of decreasing flexibility of use. Use of these options should allow incorporation of the skills into the existing ABE program: to make any wider an attempt at incorporation may entail a shift in the goals of the ABE department as a whole.

Research Question 4.

The instructors are in favour of making an attempt to include more ABS-type skills in the curriculum, and they are in favour of using ABS as a basis for curriculum development. However the degree of acceptance of the addition of any new skills to the existing program is likely to be a variable thing for both staff and students. Thus the method of addition of the skills, i.e. the packaging and presentation of the activity, would have to be carefully considered.

The instructors' comments on the Adult Basic Skills listing as represented by the mathematics skills indicate a basic acceptance of the listing, but with some suggestions for change. Although there was no suggestion that ABS was in error in terms of "adults in Alberta", there was this suggestion with respect to ABE students. Instructors seem to feel that there are certain specific skills and topics which need not be included in a program for their Adult Basic Education students. These feelings may give rise to the desire for flexibility and also the need to know whether the Adult Basic Skills will become mandatory portions of the ABE curriculum.

The instructors indicated a need for further refinement of the ABS listing in different ways. They noted the variation in specificity of the skill statements and the lack of standards of performance attached to the skills as being two deficiencies which make interpretation of the listing somewhat indefinite. There were also one or two skill statements which they found difficult to understand. During the card sort, the responses also indicated a possible need to rearrange some of the skills, specifically those skills dealing with graphs.

In keeping with their overall enthusiasm for ABS-type skills, the instructors did suggest some specific activities to make incorporation of the skills more feasible. In addition to wanting to address the question of whether the skills would become a mandatory aspect of the ABE curriculum, they suggested that ABE staff should work with the ABS mathematics skills to see which should be included in the curriculum, and to find a suitable method for categorizing the skills and fitting them into the existing three-level mathematics program.

Recommendations

The recommendations that arise from the conclusions reached in this study are presented in this section in three groups; first, recommendations for activity on the part of the Alberta Vocational Centre; second, recommendations pertaining to the Adult Basic Skills listing; third, recommendations for further research.

Recommendations for AVC

The following recommendations are made with respect to the Alberta Vocational Centre.

1. The process of curriculum development with ABS as the basis should continue.
2. The ABS mathematics skills should be incorporated into the ABE mathematics program at AVC Edmonton.
3. A skills resource bank, and enrichment modules, being the most flexible options proposed, should be developed using the ABS mathematics skills as a basis.
4. Any curriculum developed using ABS should allow individualized instruction for the students.

5. A decision should be reached to indicate whether the Adult Basic Skills should become a mandatory aspect of instruction, or whether they should be taught at the discretion of the instructor.

Recommendations for ABS

The following recommendations are made with respect to the Adult Basic Skills listing.

1. Performance standards should be designed for the skills, or at a minimum for those skills being used as the basis for curriculum development.
2. The skills concerned with graphs should be moved to the "Mathematics" category of the listing.
3. Attention should be given to the rephrasing of specific skills mentioned as being troublesome in the body of this study.

Recommendations for Further Research

The following recommendations are made for further research.

1. The study reported in this thesis should be replicated in other Alberta Vocational Centres. This would provide a wider data base for curriculum development and would help validate the findings of the present study. It is recommended that any repeat of the present study be refined by including students as a source of data. This would shift the focus of the study toward an assessment of the

skills learned rather than those taught.

2. A study should be undertaken to determine the perceived importance of the various ABS mathematics skills.
3. Studies similar to the present study should be conducted using samples from other parts of the ABS listing, for example those skills pertaining to reading, for comparison to the corresponding ABE programs in the AVC. These studies should be conducted at various AVC institutions. This recommendation is made on the basis that other instructors may have already been attempting to include "lifeskills" instruction in their courses as had the mathematics instructors at AVC Edmonton.
4. The present study made the assumption that any incorporation of the ABS Mathematics skills would not cause any fundamental changes in the ABE program structure. However, the instructors' comments noted that incorporation of ABS would foster and require a more complete, and in their words desirable, co-operation between the various ABE programs (such as reading, science and mathematics) than is presently the case. Thus it is recommended that studies be made to determine what co-operation between programs would result or be needed were the ABE programs to become ABS based.

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APPENDIX A

ABS MATHEMATICALLY ORIENTED SKILLS

ABS MATHEMATICALLY ORIENTED SKILLS

From ABS "Mathematics" Category

1. Recognize numbers
2. Write numbers
3. Assign meaning to numbers and arithmetic symbols
4. Define arithmetic terminology
5. Apply basic arithmetic operations to solve problems
6. Understand common mathematical concepts
7. Calculate proportions using ratios, fractions, percent, decimals
8. Understand currency systems
9. Assign value to coins and bills
10. Make monetary change
11. Calculate cost of goods e.g. food, services, credit
12. Differentiate between concepts of distance, area, volume, weight
13. Calculate problems involving distance, area, volume, weight
14. Comprehend metric units of measurement
15. Convert other units of measure to metric units
16. Tell time by standard, digital, 24 hour clocks
17. Comprehend relationship of time/distance
18. Calculate time/distance problems
19. Operate simple calculators
20. Plan for future increased use of electromechanical calculators

From ABS Categories Other than "Mathematics"

21. Manage finances for family
22. Manage time effectively in personal life
23. Identify gross income earned
24. Itemize deductions from income
25. Calculate income averaging where appropriate
26. Determine costs for shelter
27. Establish costs for shelter
28. Estimate utilities costs
29. Estimate food costs
30. Establish clothing expenses
31. Identify required working expenses (expenses connected with employment)
32. Establish payments to maintain insurance coverage
33. Determine income available for leisure activity
34. Determine income needed for saving and investment
35. Pay bills by cheque or cash
36. Complete bank deposit forms and bank withdrawal forms
37. Understand cash transactions
38. Reconcile bank statements
39. Maintain bank record of transactions
40. Know (bank) interest rates and payment dates
41. Be familiar with costs of savings and investment services
42. Predict ability to make payments on purchased goods
43. Calculate final price of goods and services including credit costs

44. Understand how interest rates inflate costs

45. Compare prices of goods and services

46. Meet financial committments for mortgage or rent

47. Compare costs of various modes of transportation

48. Analyze budget for transportation

49. Develop awareness of present/future economic conditions

50. Anticipate cost of maintaining life style

51. Shop comparatively for insurance coverage

52. Determine affordability of leisure time activities

53. Ascertain time available for leisure time activities

54. Consider costs associated with (moving to) each (new) location

55. Be aware of purpose of graphs, pictorial and symbolic information

56. Identify types of graphs

57. Know appropriate symbols of graphs

58. Recognize systems and symbols of graphs

59. Read word and number legends

60. Read scales

61. Extract relevant information from graphs, pictorials and symbolic information

62. Read and understand date stamps etc. when purchasing food

63. Adhere to work time schedules

64. Clarify economic needs of job

65. Decide if economic needs are met

66. Shop for food/groceries as a wise and informed customer
67. Interpret and follow recipes
68. File tax returns at time required

APPENDIX B

REQUEST AND APPROVAL TO PERFORM STUDY

alberta
vocational
centre
edmonton
10215 - 108 STREET
EDMONTON, ALBERTA
T5J 1L6

OFFICE OF
the PRESIDENT
Telephone: (403) 427-5444

April 5, 1983

Mr. Ted Brooks,
Dept. of Industrial and
Vocational Education,
Rm. 633 Education Bldg. South,
Faculty of Education,
University of Alberta,
Edmonton, Alberta.
T6G 2G5

Dear Mr. Brooks:

In reference to your letter of March 23, 1983, we are pleased that you have chosen our Institution to conduct your study. Please be assured that you have our full support and we will endeavour to assist you as much as possible.

We trust that your involvement with the ABE Math Program will meet with your expectations.

Yours truly,

Mike Andrews

Michael B. Andrews, Ph.D.
President

MBA*ks

cc. M. Needham
T. Powell
M. Lindman

Dept. of Industrial and
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Rm. 633 Education South,
Faculty of Education,
University of Alberta,
Edmonton,
Alberta T6G 2G5.

March 23, 1983

Dr. M. Andrews,
President,
Alberta Vocational Centre,
10215 - 108 Street,
Edmonton,
Alberta T5J 1L6

Dear Dr. Andrews:

Approximately one year ago, I met with you in your office to request permission to collect data for a master's thesis. The thesis centered around the CAP chart produced for the ABE Steering Committee by Art Deane and myself. At that time you expressed approval to conduct the study and asked that I write to you when I was about the conduct the study.

However, subsequent to that meeting, I came to the same conclusion as the Steering Committee; that the competency statements were not yet specific enough to work with. Since that time of course, the competencies have been greatly expanded and the resulting skills are much more specific.

I am now preparing to proceed with an adaption of my original study design, still aimed at a master's thesis. My study will be delimited to a comparison between the Math and Math-related skills that have been identified and the Math skills as presently taught in the ABE program at your institution. The aim is to refine the new skills package and allow more direct input and feedback from the ABE Math instructors. Only those instructors will be involved. This involvement will be as brief as possible and is planned to occur in approximately two to three weeks.

I have spoken to Madeline Needham, who is both Chairman of the Steering Committee and in charge of the ABE Math program, about my proposal and she has been enthusiastic.

.....2

Page 2

I would like to request permission from you to proceed. If I can supply you with any more information, please contact me through the Department of Industrial and Vocational Education at 432-3678.

Thank you for your help.

Yours truly,

Ted Brooks

Ted Brooks

cc: Madeline Needham, AVC

APPENDIX C

CARD SORT PROCEDURE
WRITTEN INSTRUCTIONS

Dear ABE Mathematics Instructor:

The Adult Basic Education Steering Committee has commissioned the development of a listing of Adult Basic Skills. Mathematics has been identified as one of the important "Core" areas containing skills that underlie and permeate other adult skill areas such as managing a home, etc. We are interested in exploring the completeness of the Mathematics area, and we would like to obtain some feedback from you on this topic.

The primary purpose of this study is to compare the Mathematics oriented Adult Basic Skills with the skills you are presently teaching in ABE Mathematics courses. There are two sections involved:

1. A section to ask which of the Adult Basic Skills you are teaching and to what extent you teach them.
2. A section (an interview) to ask for your ideas concerning implementation or future directions for the Adult Basic Skills and any concerns or suggestions you may have.

SECTION 1

This section has been designed to find out which of the Mathematics oriented Adult Basic Skills (ABS) you are teaching in the ABE Mathematics program, and the manner and extent to which you are teaching them. The section is split into four parts. Each part involves the sorting of cards into various categories. At the end of each part, we would like to discuss with you your observations about what you have just done. Please note that the frame of reference is the ABE Mathematics program as a whole and not just one specific course. In sorting cards, please place the cards into the category which is closest to the situation you believe to be true.

Part I

Each of the accompanying cards has one of the ABS skills written on it. The object is to sort the cards into 2 groups which relate to the way in which you understand the skills. You may feel that some skills contain, essentially, only a Mathematics component. You may also feel that some of the skills contain both a Mathematics component and a non-Mathematics component. Please sort the cards into 2 piles:

A) Skills which contain, essentially, only Mathematics
B) Skills which contain both a Mathematics and a non-Mathematics component

Groups A and B will be treated separately in Parts II, III and IV.

Part II

This part deals with Group A skills.

Please indicate to what extent you teach each skill (if at all). A skill taught to the fullest extent would mean that you feel that you cover the skill in your teaching such that all subcomponents or subskills inherent in that skill are taught. Sort the cards in Group A according to whether you teach the skill:

A1) Fully
A2) Somewhat
A3) Very little
A4) Not at all

Please now place the cards from each of the four groups into the corresponding envelopes for Group A (Envelopes A1, A2, A3, A4), and place the envelopes aside.

Part III

This part deals with Group B skills.

Before dealing with the extent to which you teach Group B skills, we are interested in the manner in which you teach them. Two general situations are included. It is possible, first, that you may teach both aspects of the skill, giving attention to both the Mathematics and the Non-Mathematics aspects. Second, it is possible that you use the skill primarily as a general setting in which to teach the Mathematics aspect, and that you place little emphasis on the non-Mathematics aspect. In this case, the non-Mathematics aspect simply presents a useful environment in which to teach the inherent Mathematics.

With these considerations in mind, please sort the Group B cards into three groups according to whether:

B1) You teach both Mathematics and non-Mathematics aspects of the skill.

B2) The skill is used as a general setting in emphasising only the Mathematics aspect.

B3) You do not teach the skill at all.

Now place the cards which describe the skills you do not teach at all into envelope B3 and set it aside.

Part IV

Please sort each of Groups B1 and B2 into three groups according to the extent to which you teach the skills. Again, a skill taught to the fullest extent would mean that you feel that you cover the skill in your teaching such that all subcomponents or subskills inherent in that skill are taught. A total of six groups will result:

B1.1) You teach the skill .... Fully
B1.2) You teach the skill .... Somewhat
B1.3) You teach the skill .... Very little

B2.1) You use the skill as a general setting .... Fully
B2.2) You use the skill as a general setting .... Somewhat
B2.3) You use the skill as a general setting .... Very little

Once these cards are sorted, please place them into the corresponding envelopes.

APPENDIX D

INTERVIEW QUESTION LIST

Interview Questions

1. Do you feel that there is a difference between the skills you have just been sorting and what you are presently teaching in the Math curriculum at AVC Edmonton?
   If so, what are the differences?

2. The objective of the ABS listing is to define the skills required for an adult to function in Alberta society.
   In this context, do you feel that the Math requirements are adequately represented?
   If not, what changes should there be?
   Does the ABE Math curriculum contain these changes?

3. If the Mathematics oriented Adult Basic Skills are to be included in the AVC curriculum, what changes do you feel would be required in the AVC Math curriculum in terms of:

-structure	-instruction activities
-resources	-use of available time
-facilities	-any other changes

4. Do you feel that the ABS listing should be used as a basis for the curriculum development process? Please support your comments.

5. Do you have any overall suggestions for the ongoing curriculum renewal/development process?

6. Do you have any other comments?

APPENDIX E

CARD SORT RESPONSES

APPENDIX E

RESULTS OF CARD SORT

Skill No.	Instructor						
	1	2	3	4	5	6	7
1	A1	A1	A1	A1	A1	A1	A1
2	A1	A1	A1	A1	A1	A1	A1
3	A1	A1	A1	A1	A1	A1	A1
4	B21	A1	A2	B21	A1	A1	A2
5	A1	A1	B22	B21	A2	A1	A1
6	A1	A1	A2	A1	A2	A1	A1
7	A2	A2	A2	A1	A3	A2	A1
8	B3	B11	B3	A1	B22	B3	A3
9	A1	A1	A2	B11	A2	A2	A1
10	A1	B11	A2	B11	A2	A2	A1
11	A1	B11	B22	B23	A3	A2	A1
12	A4	A2	B23	A2	A3	A2	A2
13	A4	B12	B23	B22	A3	A2	A2
14	A3	A2	B11	A2	A2	A2	A1
15	A3	A2	A1	A3	A2	A2	A2
16	A3	B12	A3	B21	A3	A1	A3
17	A2	A3	B23	A3	A2	A2	A1
18	A2	B12	B22	B22	A2	A2	A1
19	A2	A2	A1	A2	A2	A2	B11
20	B3	B3	B3	B13	A2	B3	B3
21	A4	B23	B3	B3	B22	B12	B21
22	B3	B3	B3	B3	B3	B22	B3
23	A2	B11	B22	B11	A2	A3	B11

APPENDIX E

(con't)

Skill No.	Instructor						
	1	2	3	4	5	6	7
24	A4	B11	B22	B3	A2	A3	B21
25	B3	B3	B3	B3	B3	B23	B3
26	A2	B11	B22	B22	B23	A3	B11
27	A3	B23	B3	B22	B23	B11	B21
28	A1	B3	B3	B3	B3	B11	B22
29	A1	B12	B22	B22	B3	A2	B12
30	A3	B3	B3	B22	B3	B12	B21
31	A3	B3	B3	B22	B3	B12	B22
32	A2	B3	B3	B3	B3	A4	B23
33	A2	B3	B3	B3	B3	B3	B22
34	B3	B3	B3	B3	B3	B21	B22
35	A1	B3	B23	B3	A2	A3	B21
36	B22	B3	B23	B12	A2	A2	B21
37	B3	B11	B23	B12	A2	B11	A1
38	A2	B13	A4	B3	A2	A2	B12
39	B22	B13	B23	B3	A2	B11	B12
40	B3	B3	B22	B3	A2	B11	B11
41	B3	B3	B3	B22	A2	B12	B21
42	B3	B13	B3	B3	B23	B12	B22
43	A1	B11	B22	B22	A2	B11	A1
44	B3	B11	B22	B12	A2	B12	B11
45	A2	B11	B22	B21	A2	B12	B11
46	A2	B3	B3	B3	B23	B12	B22

APPENDIX E

(con't.)

Skill No.	Instructor						
	1	2	3	4	5	6	7
47	A2	B12	B3	B22	B23	B22	B12
48	A3	B23	B3	B3	B23	B12	B21
49	B3	B3	B3	B3	B3	B22	B22
50	B3	B23	B3	B22	B3	B3	B22
51	B3	B23	B3	B3	B3	B3	B22
52	B3	B3	B3	B3	B3	B3	B22
53	A4	B3	B3	B3	B3	B3	B3
54	B3	B3	B3	B3	B3	B3	B22
55	B3	B12	B12	B21	A2	A3	A2
56	B3	A2	B12	A1	A2	A3	A2
57	B3	B12	B12	A1	A2	A3	A2
58	B3	B12	B12	A1	A2	A2	A2
59	A1	B12	B12	A1	A2	A1	A2
60	A4	B12	B12	B3	A2	A2	A2
61	B3	B12	B12	B22	A2	B11	B11
62	B3	B13	B3	B3	B3	B11	B22
63	B3	B3	B3	B22	B12	B22	B23
64	B3	B3	B3	B3	B3	B22	B22
65	B3	B3	B3	B3	B3	B22	B3
66	B22	B12	B23	B12	B22	B11	B21
67	B3	B12	B3	B23	B23	B12	B11
68	B3	B12	B13	B3	B23	B12	B22

APPENDIX F

SKILLS RATED: "NOT AT ALL"

APPENDIX F

SKILLS RATED "NOT AT ALL"

Rated by 1 Instructor Only

Skill No.

12. Differentiate between concepts of distance,area volume, weight

13. Calculate problems involving distance, area, volume, weight

27. Establish costs for shelter

29. Estimate food costs

36. Complete bank deposit forms and bank withdrawl forms

37. Understand cash transactions

39. Maintain bank record of transactions

44. Understand how interest rates inflate costs

47. Compare costs of various modes of transportation

55. Be aware of purpose of graphs, pictorial and symbolic information

56. Identify types of graphs

57. Know appropriate symbols for graphs

58. Recognize systems and symbols of graphs

61. Extract relevant information from graphs, pictorials and symbolic information

Rated by 2 Instructors

24. Itemize deductions from income

25. Calculate income averaging where appropriate

38. Reconcile bank statements

48. Analyze budget for transportation

APPENDIX F

(con't.)

Rated by 2 Instructors (con't.)

60. Read scales

67. Interpret and follow recipes

68. File tax returns at time required

Rated by 3 Instructors

18. Understand currency systems

21. Manage finances for family

30. Establish clothing expenses

31. Identify required working expenses
(expenses connected with employment)

40. Know (bank) interest rates and payment dates

41. Be familiar with costs of savings and investment services

42. Predict ability to make payments on purchased goods

46. Meet financial committments for mortgage or rent

63. Adhere to work time schedules

Rated by 4 Instructors

28. Estimate utilities costs

50. Anticipate cost of maintaining life style

62. Read and understand date stamps etc. when purchasing food

APPENDIX F

(con't.)

Rated by 5 Instructors

20. Plan for future increased use of electromechanical calculators

32. Establish payments to maintain insurance coverage

33. Determine income available for leisure activity

34. Determine income needed needed for saving and investment

49. Develop awareness of present/future economic conditions

51. Shop comparatively for insurance coverage

64. Clarify economic needs of job

Rated by 6 Instructors

22. Manage time effectively in personal life

25. Calculate income averaging where appropriate

52. Determine affordability of leisure time activities

54. Consider costs associated with (moving to) each (new) location

65. Decide if economic needs are met

Rated by 7 Instructors

53. Ascertain time available for leisure time activities

APPENDIX G

SKILLS PLACED IN CATEGORY "B"

("SKILL USED AS A GENERAL SETTING")

APPENDIX G

SKILLS PLACED IN CATEGORY "B2"

("SKILL USED AS A GENERAL SETTING")

Skills Placed in Category "B2" by 1 Instructor

Skill No.

8. Understand currency systems

12. Differentiate between concepts of distance, area, volume, weight

16. Tell time by standard, digital, 24 hour clocks

17. Comprehend relationship of time/distance

22. Manage time effectively in personal life

23. Identify gross income earned

25. Calculate income averaging where appropriate

28. Estimate utilities costs

32. Establish payments to maintain insurance coverage

33. Determine income available for leisure activity

37. Understand cash transactions

40. Know (bank) interest rates and payment dates

44. Understand how interest rates inflate costs

52. Determine affordability of leisure time activities

54. Consider costs associated with (moving to) each (new) location

55. Be aware of purpose of graphs, pictorial and symbolic information

61. Extract relevant information from graphs, pictorials and symbolic information

62. Read and understand date stamps etc. when purchasing food

65. Decide if economic needs are met

APPENDIX G

(con't.)

Skills Placed inCategory "B2" by 2 Instructors

Skill No.

4. Define arithmetic terminology

5. Apply basic arithemtic operations to solve problems

11. Calculate cost of goods e.g. food, services, credit

13. Calculate problems involving distance, area, volume, weight

18. Calculate time/distance problems

24. Itemize deductions from income

29. Estimate food costs

30. Establish clothing expenses

31. Identify required working expenses (expenses connected with employment)

34. Determine income needed for saving and investment

35. Pay bills by cheque or cash

39. Maintain bank record of transactions

41. Be familiar with costs of savings and investment services

42. Predict ability to make payments on purchased goods

43. Calculate final price of goods and services including credit costs

45. Compare prices of goods and services

46. Meet financial committments for mortgage or rent

49. Develop awareness of present/future economic conditions

51. Shop comparitively for insurance coverage

64. Clarify economic needs of job

67. Interpret and follow recipes

68. File tax returns at time required

APPENDIX G
(con't.)

Skills Placed in Category "B2" by 3 Instructors

Skill No.

21. Manage finances for family

26. Determine net income

36. Complete bank deposit forms and bank withdrawl forms

47. Compare costs of various modes of transportation

48. Analyze budget for transportation

50. Anticipate cost of maintaining lifestyle

63. Adhere to work time schedules

Skills Placed in Category "B2" by 4 Instructors

Skill No.

27. Establish costs for shelter

66. Shop for food/groceries as a wise and informed consumer